Rubber Journal and International Plastics

UNIVERSITY OF MICHIGAN

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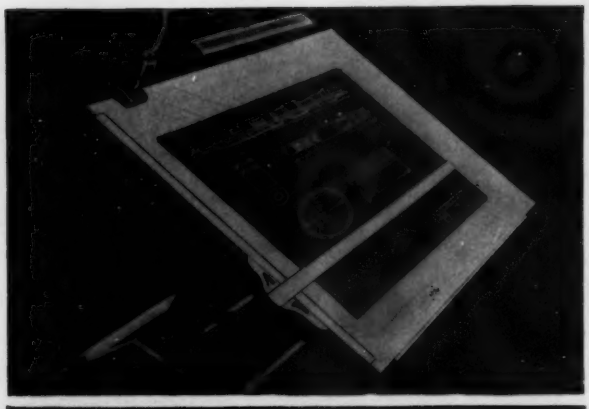
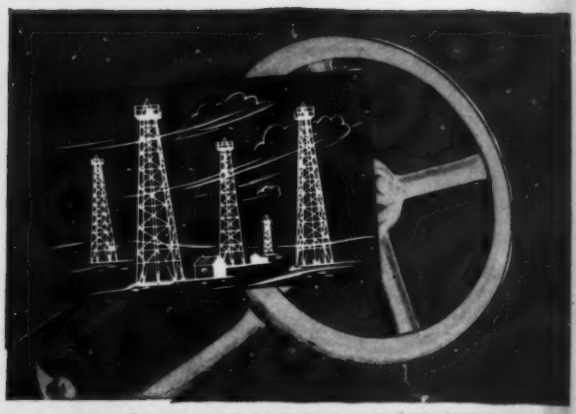
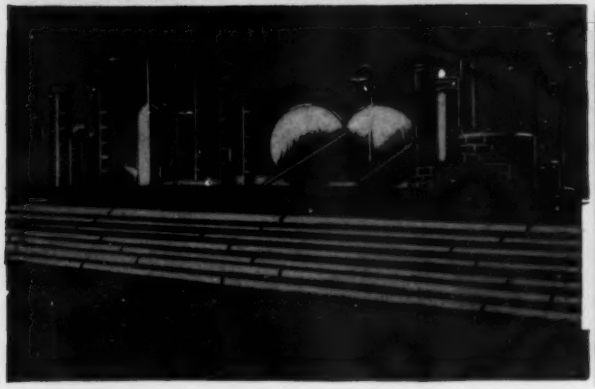
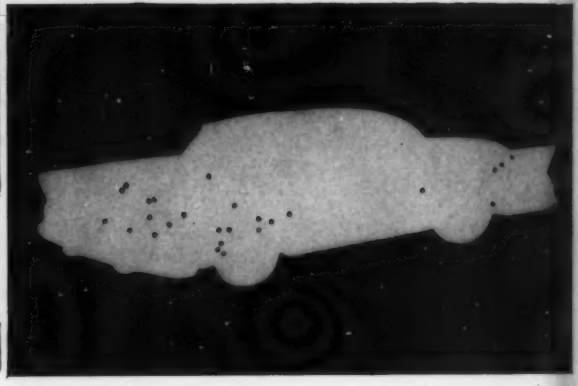
US RUBBER

Naugatuck Paracrils









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IN ITS 76th YEAR

September 5 1959

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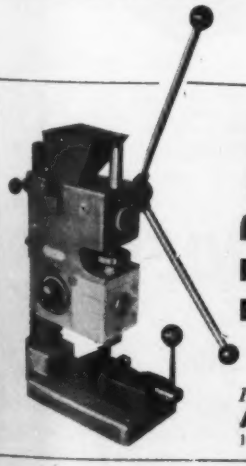

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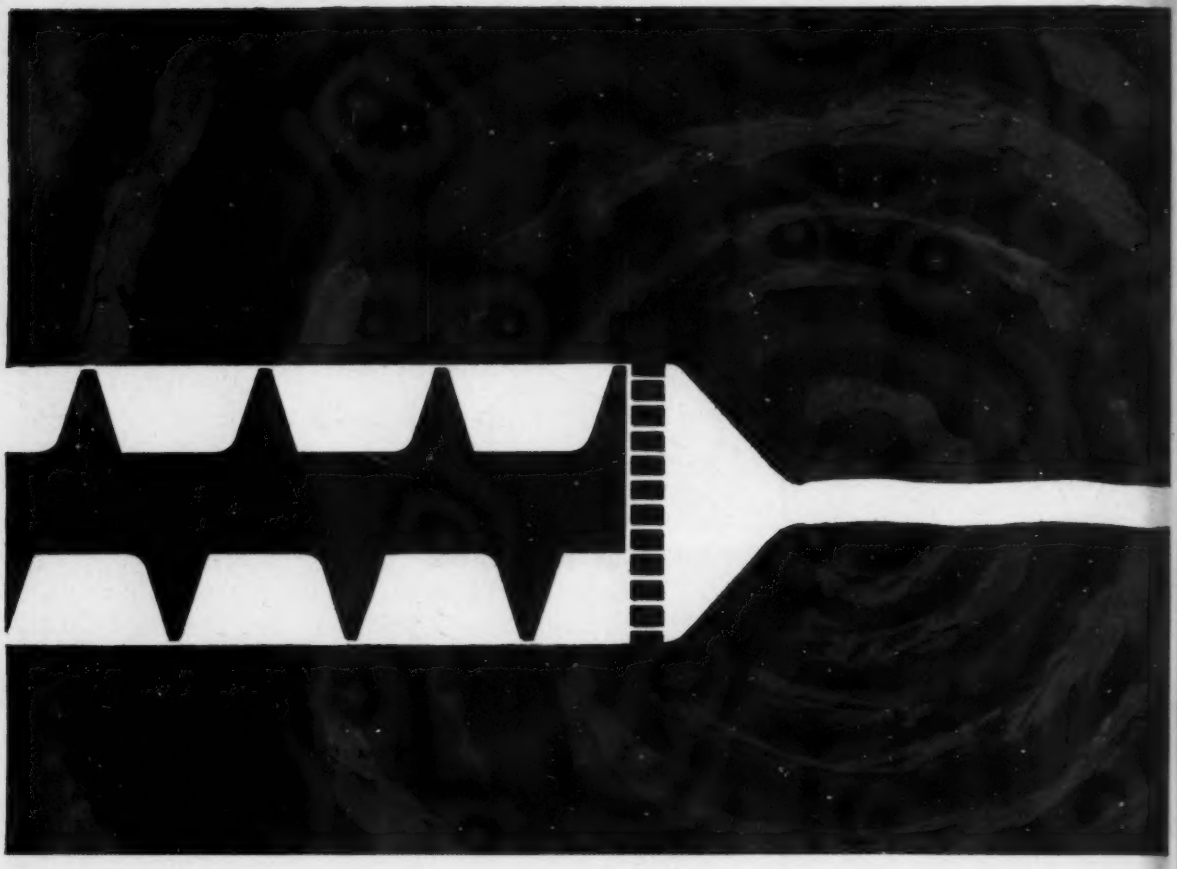

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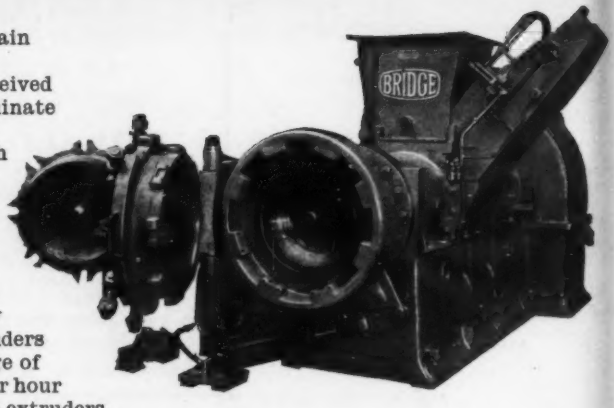

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NOTES of the WEEK

Church and Industry

PUBLISHED during the recent printing 'close season' was a report on 'The Task of the Church in Relation to Industry.' Issued by the Church Information Office, the report contains new plans for the development of the Church's work in industrial areas. The report discusses the Church's concern for industry. It indicates lines of development both at the local and the national levels, and recommends that a committee should be set up under the Church Assembly's Board of Social Responsibility in order to provide close liaison with existing work and to promote new developments. Sir John Wolfenden, the Board's chairman, recalls in a Foreword the submission to the Church Assembly in 1956 of the report entitled 'The National Church and the Social Order.' He expresses the hope that the new report will be regarded as consonant with the policy in the wider field of the Church's responsibility in society. The report recognizes the Church's responsibility in the industrial sphere. 'The Christian Church,' it asserts, 'is concerned with the quality of human life, both of men individually, and of their society.' Industry and industrial organisation today determine to a large degree the quality of human life, both of men and of their society. 'Therefore the Church should be concerned with industry and the industrial organisation of society.' It acknowledges that the Church has stood apart from the growth of the new industrial civilization, and that in a period of rapid social growth and change the Church has, with few exceptions, made little attempt to understand and penetrate the structure and life of the industrial society around it. It therefore accepts the exhortation which it quotes from the report of the Duke of Edinburgh's Study Conference on Human Problems of Industrial Committees, that 'there is upon all religions an obligation to be relevant, that is to translate permanent truths into terms which are seen to be adequate and appropriate to the present world of life and thought.' Few would disagree with that, nor deny the need.

Plastics 1959

DESCRIBED as the international trade fair of the industry, the Dusseldorf Plastics Exhibition will be beyond all doubt a most notable occasion. Some 700 exhibitors are to display their products over an area of 667,368 sq. ft. The presence of foreign firms, numbering 127 from 14 countries, means that for the duration of the fair Dusseldorf will become a meeting and market place for manufacturers and processors of plastics from all over the world. Among the many details of interest are such facts as that one-quarter of all exhibiting firms come from the engineering industry and that therefore there will be a tremendous range of machines on view, with the emphasis clearly on automatic production techniques. Then, too, the first complete collection of polycarbonate products will be shown and, of equal interest, a wide range of products made from the polypropylenes. It is, of course, impossible to mention anything like all the machines, materials and the myriad finished products that will be on view. A date in Dusseldorf between October 17 and 25 is clearly indicated.

Riding on Rubber

FEW weeks go by without someone somewhere stating that world demand for rubbers both natural and synthetic will continue to increase for many years. With the tempo of the increase in world standards of living slowly speeding up, such statements are clearly truisms. Indeed, there is evidence everywhere of the trend which embraces not only greater demand for established uses of rubber but more and more new uses. Typical of the latter is the use of rubber as the sole springing medium in the new baby cars announced recently by the British Motor Corporation and its further use in the same cars as a particularly ingenious form of coupling. The springs, patented by Moulton Developments Ltd. and manufactured by the Dunlop Rubber Co. Ltd., have stood up to exhaustive tests and it is stated that they will last the life of the car without replacement. The BMC is stated to have planned for an eventual output of 200,000 a year.

Oh Well!

JUST why the part of the year immediately past should be called the 'silly season' is by no means clear. Some hold that it is because August is at once traditionally the holiday month and, according to weather records, about the third wettest month in the year; not the best of times to choose to go away. Even so, a strong case could be made out for September to take the title, if only because it sees the return of so many from their holidays to the office or factory. With recurring recollections of new faces, new places, it is not the easiest thing in the world to pick up the traces. Crowded in-trays fade into pictures of blue seas and skies; of fairway and lawn; of the long white road over the hill or the still river. Tools of trade blur out of focus, concentration blown quite away by the remembered winds that blew across the bay, waving white sails. And here is somebody asking for rubber bushings, or a gadget moulded 'in plastic'—quotations for the minimum economic quantity! Never did decide which was the better time: sunset with red cliffs and clouds and dark birds homing or silver waves lapping a morning beach. What's this . . . specification requires modulus of . . . ? Oh, well!

NEWS *Briefs*

US LABOUR CONTRACTS — JAPANESE RUBBER INDIAN TYRE IMPORTS—DUNLOP RHODESIAN FACTORY — CHINESE INTEREST IN HUNGARY

●**United States**—The special meeting of the Commodity Exchange Incorporated requested by members of the rubber trade group was adjourned recently for lack of a quorum. No new meeting date was fixed. The meeting was called to discuss restrictions on Rex contract September delivery trading.

●**Hungary**—Mr Ferenc Hegyi, leader of a Hungarian economic delegation to China, which has recently returned to Budapest, told the newspaper *Népszabadság* that the Chinese had made enquiries about obtaining rubber and synthetic materials installations. The Chinese Ministry for the Chemical Industry, said Mr Hegyi, were also interested in various synthetic material extruders, PVC sheet presses, and machinery to manufacture polythene, as well as automatic machinery and continuous presses for making plastic materials.

●**United States** — New contracts covering 1,300 employees have been signed by Congoleum-Nairn Inc., and the AFL-CIO, United Rubber Workers Union, the Union has announced. Employees will receive a general wage increase of six cents an hour, retrospective to August 1, under a wage agreement which expires in one year. Pension improvements including a 45 cent increase to 2.25 dollars a month per year of service and other fringe benefits come under sections of the contracts which expire in three years.

●**United Kingdom**—Cawley Plastics Ltd., Byfleet Road, New Haw, Weybridge, Surrey, have delivered what are believed to be the largest all-plastics vessels yet made. The vessels, in Tugplas, a chemically bonded lamination of unplasticized PVC and glass-fibre-polyester, are up to 32ft. high and 4ft. in diameter.

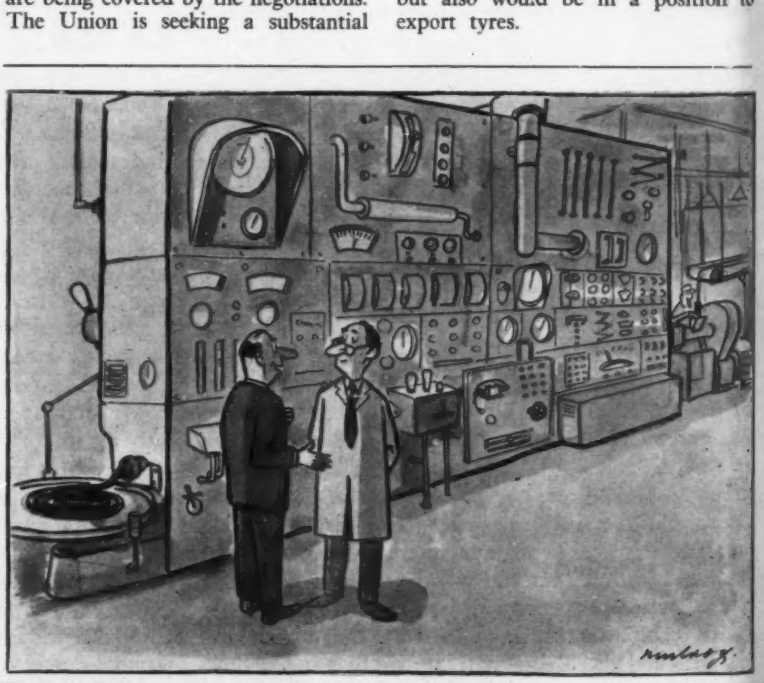
●**United States**—The Union Carbide Corporation has announced that its Italian affiliate, SPA Celene of Sicily, would shortly double its output of polythene. SPA Celene is the Sicilian Polythene and Ethylene Oxide Co., owned jointly by Union Carbide and the Societa Odison of Milan. Mr Morse Dial, Union Carbide's board chairman, said the increased output represented an increase of facilities currently under construction at Priolo, near Syracuse, in Sicily. The completed installation would be capable of producing 60 million lb. of polythene annually. At the same time, the Sicilian company would expand its petro-chemical activities to include production of ethanol, butanol, 2-ethyl-hexanol and Ethanolamines. The Sicilian plant was due for completion in the last quarter of this year, he added.

●**Southern Rhodesia**—The £2,000,000 Dunlop tyre factory has been opened in Bulawayo by Sir Roy Welensky, Prime Minister of the Central African Federation. The factory's 44-acre site is three miles south-west of Bulawayo in the Belmont light industrial area, and is well connected with other industrial areas by road and rail. It was designed by the company's architect, Stuart Bentley, and employs 100 Europeans and 400 Africans.

●**United States**—The United Rubber Workers Union has announced that wage negotiations with the General Tire and Rubber Co. opened on Tuesday in Cleveland. Some 3,000 workers in Akron and Waco, Texas, are being covered by the negotiations. The Union is seeking a substantial general wage increase in the talks. Talks between the Union and the Goodyear Tire and Rubber Co. and between the Union and the US Rubber Co. are already under way.

●**Japan**—Japanese rubber manufacturers have started to investigate, through the Japanese Export Trade Promotion Agency (JETRO) and other channels, movements in foreign countries, especially the US, Canada and Australia, to restrict the imports of their products, the Japanese Rubber Manufacturers' Association has announced. The investigation is designed to maintain the present steady increase in Japanese exports of rubber articles and to secure stable foreign markets for Japanese rubber.

●**India**—The State Trading Corporation has been exploring the possibilities of importing tyres and tubes on a rupee payment basis, according to the Minister of Industry, Mr Manubhai Shah, addressing the Indian Parliament. He said that four more factories for the production of tyres had been licensed. The current production was also looking up. Within the next two or three years India would not only become self-sufficient but also would be in a position to export tyres.



'We did it, Bellamy—we certainly fixed that 1½" extruder automatic take off!'—44

Mechanical Destruction of Polymers

FORMATION OF MACRORADICALS

RABRM Translation No. 713 of a paper of the above title by S. E. Bresler and co-workers of original reference Zh. Tekhn. Fiz. 1959, *29*, 358 raises three points of general interest in addition to its report of specific advance in its field.

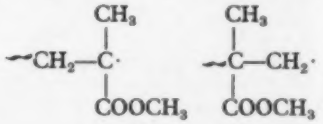
1. The Russian authors are clearly in the forefront of research in work on important rubber processing operations and are bringing to bear to these problems highly original ideas and testing them with the most advanced of scientific equipment.

2. This particular paper was submitted to the Editor of the Russian Journal on Dec. 22 1958 and appeared in the March 1959 issue. Many of our technical journals could well seek to emulate such speedy publication.

3. The RABRM Information department had this paper translated and copied complete with figures for its Members almost as soon, we presume, as Russian readers had got round to reading their issue of the Journal.

This paper demonstrates for the first time by direct measurement of the electron magnetic resonance properties of radicals that polymer chains are ruptured to form macroradicals by mechanical forces. The experimental procedure was to freeze the polymer-polymethylmethacrylate, polystyrene, polytetrafluoroethylene, polyisoprene (natural rubber), polythene or polycaprolactam—in liquid nitrogen and then mill it with a mechanical bit. The milled turnings dropped in vacuo directly into the sample cell of the electron magnetic resonator.

Paramagnetic resonance spectra were recorded in all cases and the fine structure characterized. From these spectra and similar spectra developed during polymerization, identification was made of the actual chemical structure of the macroradicals. For example, polymethylmethacrylate yielded the spectrum of Structure I, but II which must have been simultaneously formed was not detected, presumably being sufficiently reactive even at 77°K to react with oxygen in the liquid nitrogen. The spectrum of the peroxy radicals of both structures were observed.



(i) (ii)

The intensities of the spectra showed that the torn surfaces of the polymer had a radical density of one radical per 30Å,^{2} in other words, a copious quantity of radicals.

Polyflex Price Change

Monsanto Chemicals Ltd. announced on September 1 reductions of up to 18% in the prices for crystal-clear Polyflex 100 sheet in gauges from 0.003in. to 0.020in. An example of the reductions is that the basic cost of 0.0075in. sheet is now as low as 24.7d. per thousand sq. in.

Polyflex 100 biaxially-oriented polystyrene sheet is available from stock in standard roll widths of 21in. and 42in. Its principal uses are for fabricated and thermo-formed thin walled containers and closures, and as a carton window patching material.

Sir Halford Reddish, chairman and managing director of the Rugby Portland Cement Co. and a director of the Hawker Siddeley Group, has been elected a director of Alfred Herbert Ltd., to act in a consultative capacity.

E. P. Rydings

The death took place on Friday August 21 1959 of the former managing director of Zama Ltd., Salford, Mr E. P. Rydings.

CORRESPONDENCE

No Humdrum Conformity

To the Editor

Sir,—On perusing an American or German rubber trade journal, I expect to find a generally dull series of articles on rehashed rubber technology thought by many to be novel, rubber market statistics, dinner lectures, and so-called 'industry intelligence.' Nor am I surprised to find this hospital-like menu served for my monthly consumption. Now, being a reasonable man, I realize that a trade journal must contain some material of this sort. It's just the thing to do, you know. But in a British journal such as yours, I have grown accustomed to look forward to at least a measure of pleasant departure from the humdrum conformity so characteristic of today's trade literature (and perhaps so characteristic of today's mankind).

Dr Schidrowitz's column is still with us, thank God; and even though I have never had the pleasure of meeting the gentleman, I shall always regard him as a friend for his able and interesting presentations of novel material with real scientific and technological importance.

But what has happened to your British philosophy toward 'the playing fields of Eton'? More specifically, what has become of the golfing news and pictures which I have always looked forward to at this time of the year? Who won the trophy? Did the rain and wind make the tournament a tough one? How is Ian Keith's game these days? I do not know, Mr Editor, whether you play *the game* or not. But you must surely know that those of us who are avid golfers (and what golfer isn't?) recognize no national boundaries to our most consuming interest, regardless of our handicaps.

Is this sad demise of the golfing news the outcome of publication economics, is it due to the pressures of your advertisers, or some similar species of business purists, or has editorial policy been taken over by some chess players (perish the thought!) or, even worse, by some recent university graduates in modern journalism or business administration? Have you, too, 'gone American?' You had better hold an editorial policy conference post-haste, gentlemen, or we of the golfing fraternity shall be compelled to depart from your fold and join the ranks of the readers of 'Sports Illustrated,' or its British equivalent.

JOHN REHNER, JUN.

200 Linden Avenue,
Westfield, New Jersey,
United States.

RJIP policy has not changed. The recent dispute in the UK printing industry proved a bogey that effectively bunkered publication for seven weeks. A report on the 'Trophy' appeared, with pictures, in the Journal for August 22.—Ed.

Synthetic Rubbers in Cables—3

NEOPRENE SHEATHING MATERIALS

By W. S. PENN, B.Sc.

SUMMARY

Twenty years ago natural rubber compounds were the only type of rubber-like insulants used on cables. Since 1939 the position has changed rapidly, the war giving added impetus to the change, and such materials as Neoprene, butyl rubber, silicone rubber and SBR, are now well-established products. The rubber cable technologist is in a fortunate position because new materials are continually being produced by suppliers (at least on a development basis). The cable technologist has to examine them all, because anything might fit a gap in the list of desirable characteristics of materials. The tyre technologist has to be far more practical and his scope is clearly limited.

The present series of articles (previous instalments appeared in RJIP, August 22 and 29) discusses various aspects of synthetic rubbers. These include techniques of compounding and processing; reasons for the use of the materials; results achieved with different compounds and to different specifications are considered, and economic factors are mentioned where appropriate.

THE most important type of PCP mix in the cable industry is without doubt the HD variety. A considerable amount of work must have been carried out on this basic compound during the years. It will be discussed at length in the present article. The GP type of mix is also of importance and its use is rapidly expanding. Other types of compounds to be considered will be heat resisting mixes and white and coloured HD mixes which are required from time to time.

Basic HD Sheaths

The principal requirements of an HD sheath is that it will comply with BS 2899. However, it must also have good abrasion characteristics and in the cable industry 'abrasion' is used in the general sense of robustness. The compound must process well. Extrusion is comparatively simple, but large diameter cables (2½in. or more) are often lapped and a good bonding mix is required for this purpose. Costs also have to be kept in mind so that conventional compounding techniques cannot be fully utilized.

The early type of HD mix containing simply MPC or EPC blacks as the filler met the specification requirements without difficulty. Typical mixes are given in Table 1.

TABLE 1

	Extrusion mix	Lapping mix	Specification
Neoprene 'GN' ..	100.0	100.0	
Magnesium Oxide ..	4.0	4.0	
Zinc oxide ..	5.0	5.0	
Stearic acid ..	0.5	0.5	
Paraffin wax ..	2.0	2.0	
Process oil ..	10.0	12.0	
Antioxidant (PBN) ..	2.5	2.5	
Wood rosin ..	—	5.0	
Factice ..	—	5.0	
EPC black ..	50.0	50.0	
MINS. CURE AT 141°C. ..	30	30	
Tensile strength psi	3,300	2,800	1,600
Elongation %	550	560	250
Tear lb./in. ..	60	50	30
Tensile after ageing % ..	92	91	85
Elongation after ageing %	85	85	70

Basic HD PCP Sheaths

The great margin of safety in meeting the specification will be noted. This applies to the ageing results as well as the initial values. The only objection to such mixes as the above is cost, so that a reduction in cost was the first major change in HD PCP mixes.

Intermediate HD Sheaths

It was quite obvious, very early on, that there was considerable scope for the use of cheap fillers in HD mixes to bring down the cost. Most companies, therefore, added a proportion of whiting, china clay or French chalk to their mixes. Some results are given in Table 2.

As would be expected there is a progressive lowering in tensile strength and tear resistance with increasing whiting content. Even so, reasonable proportions may be added whilst still complying with the specification. Exactly which level is chosen depends entirely on the factor of safety desired. This in turn depends on consistency of production and in any case a reasonable natural variation must be expected.

Modern HD Mixes

The type of mix given in Table 2 would no doubt have continued in use for some time had it not been for the advent of British produced carbon blacks. Most rubber companies, including those making cables, carried out considerable work to introduce these blacks, usually quite successfully. There were initial scorch difficulties, but with lower accelerator levels, retarders and modified processing conditions, these difficulties were overcome.

It is quite possible to formulate an HD PCP Sheath with all HAF black and some results are given in Table 3. Unfortunately, the conducting nature of the furnace blacks, a boon to most types of product, is not exactly the best property for a cable sheath. Although theoretically cable sheaths are not used for insulating purposes, many people believe that they do have

TABLE 2

Neoprene 'GN'	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Magnesium oxide	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Zinc oxide	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Stearic acid	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Paraffin wax	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Process oil	10.0	11.0	12.0	13.0	14.0	15.0	13.0
Antioxidant (PBN)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
EPC black	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Whiting	—	5.0	10.0	15.0	20.0	25.0	—
French chalk	—	—	—	—	—	—	15.0
MINS. CURE AT 141°C. ..	30	30	30	30	30	30	30
Tensile strength psi	3,200	2,850	2,320	1,900	1,750	1,610	1,800
Elongation %	530	535	550	555	570	565	600
Tear lb./in.	61	56	50	42	35	29	45
Tensile after ageing % ..	93	91	90	91	89	88	92
Elongation after ageing ..	85	85	86	82	75	76	83

Use of cheapening fillers in HD mixes

Printers' rollers from Isocyanates and POLYESTERS by ICI

I.C.I. Isocyanates and Polyesters can be used to make a soft, resilient material eminently suitable for printers' rollers. Hardwearing and unaffected either by humidity or temperature changes, these rollers are very durable and can be cleaned easily; their non-porous surface always retains a good tack. They can be run at the highest speeds and inking is uniformly good. Colour changes can be made quite easily, without danger of tinting.

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x 37

insulating properties, which is true to a point. More important than this, however, is the fact that certain large customers use an electrical test method to look for tears in sheaths. This is quite impossible with a conducting sheath.

A compromise has, therefore, been struck and most companies employ a mixture of channel black and furnace black. Some typical results are given in Table 3.

TABLE 3

Neoprene 'GN' ..	100.0	100.0	100.0	100.0
Magnesium oxide ..	4.0	4.0	4.0	4.0
Zinc oxide ..	5.0	4.0	4.0	4.0
Stearic acid ..	0.5	0.5	0.5	0.5
Paraffin wax..	2.0	2.0	2.0	2.0
Process oil ..	10.0	10.0	10.0	10.0
Antioxidant (PBN) ..	2.5	2.5	2.5	2.5
EPC black ..	50.0	—	25.0	25.0
HAF black ..	—	50.0	25.0	25.0
French chalk	—	—	—	10.0
MINS. CURE AT 141°C. ..	30	20	25	25
Tensile strength psi	3,300	3,000	3,120	2,200
Elongation %	500	450	440	450
Tear lb./in. ..	55	50	51	40
Tensile after ageing % ..	94	90	90	89
Elongation after ageing %	83	80	80	79

Modern HD PCP Compounds

The last mix in the table represents the type of compound in use today. Minor modifications will undoubtedly be required from company to company. For example, the flame resistance might not be entirely satisfactory and a flame retardant such as a chlorinated paraffin might need to be added. Further, lubricants might also be need to reduce mill sticking, and it should be noted that a change to Type 'W' polymers will assist in this direction.

One of the difficulties of cable makers is decentralization of the sheath during cure. Curing is effected by taping the cables and/or lead sheathing them (the tapes and lead are stripped off afterwards) and curing in an autoclave, at steam pressure varying between 35 and 40lb. per square inch. Some of the cables are very heavy, particularly in long lengths, and therefore the PCP sheath must be stiffened up in some way. One method is to add 2-3 parts of a polymer like Type 'S.' If this is done a 50:50 masterbatch should first of all be made with type 'GN' and this then added with the remainder of the polymer in the Banbury.

GP Sheaths

There are certain fundamental differences between HD and GP sheaths. The tensile characteristics required are not so great and this means cheaper compounds. Cheapness is usually accomplished by a change from black to non-black fillers.

Another fundamental change is in processing requirements. GP sheaths are usually employed on smaller diameter cables and are extruded by CV. Fairly fast curing mixes are therefore required. GP mixes are also often required to be coloured so that in such cases white fillers rather than cheap non-reinforcing blacks must be used.

The type of filler or fillers is normally a question of choosing between talc, china clay, whiting and activated chalk. Usually a mixture of two of these gives the cheapest and best processing product. Some typical compounds are given in Table 4.

TABLE 4

Neoprene 'GN'	100.0	100.0	100.0	100.0	
Magnesium oxide	4.0	4.0	4.0	4.0	
Zinc oxide	5.0	5.0	5.0	5.0	
Stearic acid	0.5	0.5	0.5	0.5	
Process oil	15.0	15.0	15.0	15.0	
China clay	60.0	60.0	60.0	—	
Whiting	60.0	50.0	—	—	
Talc	—	—	—	60.0	
A.C.C.	—	—	60.0	40.0	
FEF black	—	10.0	—	20.0	
Antioxidant (PBN)..	2.0	2.0	2.0	2.0	
Paraffin wax	2.0	2.0	2.0	2.0	
Accelerator (ethylene thiourea)	0.5	0.5	0.5	0.5	
MINS. CURE AT 141°C.	10	10	10	10	Specn.
Tensile strength psi	1,350	1,660	1,450	1,880	1,200
Elongation %	730	810	720	800	250
Tensile after ageing %	97	94	94	92	85
Elongation after ageing %	76	74	77	74	70

GP PCP Sheathing Compounds

If any scorching difficulties are experienced it might be necessary to add 0.5–1.0 parts MBTS. Colours can, of course, be added as required, with the usual proportion of titanium dioxide. As would be expected, the FEF blacks give a considerable boost to the tensile properties of PCP compounds. Extrusion is also helped and it is possible to obtain a really smooth finish. This applies also to the HD mixes containing furnace black.

Heat Resisting Compounds

With the increasing usage of butyl rubber, it has been necessary to find a suitable sheath with the correct temperature characteristics. Butyl operates continuously at 85°C. which means that the sheath should operate at 75°C.–80°C.

PCP sheaths, particularly those loaded with carbon black, are just about good enough for these temperatures. It should be stressed that this statement applies to sheaths for continuous operation (a minimum of 20 years) and that PCP can be used at higher temperatures for shorter periods.

A use which has caused difficulty is the PCP sheath for Admiralty silicone cables. There is a test where the sheath has to withstand a temperature of 110°C.–120°C. for 16

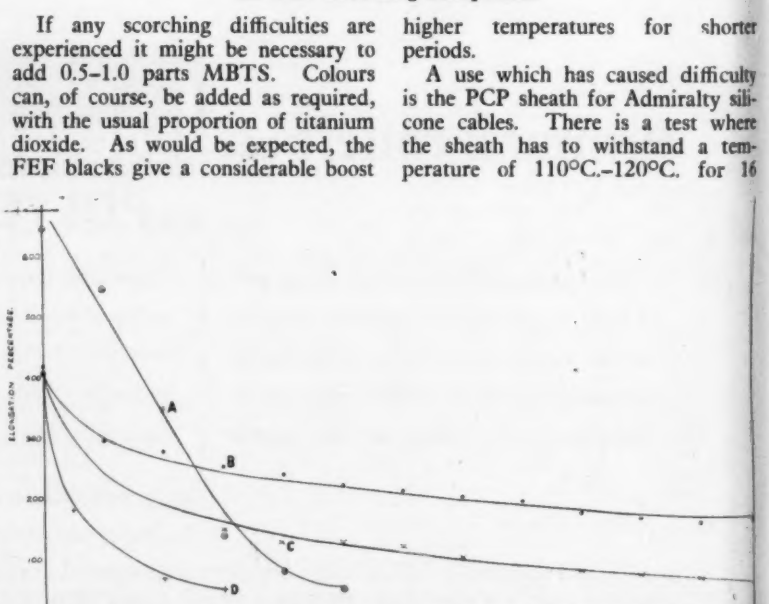

Fig. 1. Heat resistance of PCP. A.—at 120°C. (white heat resisting). B.—at 70°C. (heavy-duty grade). C.—at 82.2°C. (heavy-duty grade). D.—at 121°C. (heavy-duty grade)

days. Conventional HD PCP compounds are very marginal on this test.

The conventional methods of improving heat resistance are to increase the quantity of and to use a more efficient antioxidant; to use increased quantities of zinc oxide; to introduce an accelerator; to replace black with white fillers and to change to 'W' type polymers. With conventional black fillers in HD PCP sheaths the first three methods did not effect much improvement.

The best method was undoubtedly found to be the use of white fillers and 'W' type polymers. Some compounds which were tried are given in Table 5.

TABLE 5

Compound No.	1	2	3	4	5
Neoprene 'GN'	100.0	100.0	100.0	100.0	—
Neoprene 'WRT'	—	—	—	—	100.0
Magnesium oxide	4.0	4.0	4.0	4.0	4.0
Zinc oxide	5.0	12.0	12.0	12.0	12.0
Stearic acid	0.5	0.5	0.5	0.5	0.5
Paraffin wax	2.0	2.0	2.0	2.0	2.0
Process oil	10.0	10.0	12.0	10.0	10.0
Antioxidant	2.5	3.0	3.0	3.0	3.0
Whiting	—	—	35.0	16.0	16.0
China clay	10.0	10.0	35.0	16.0	16.0
FEF black	—	—	—	25.0	25.0
Accelerator (ethylene thiourea)	—	0.5	0.5	0.5	1.0
EPC black	25.0	25.0	—	—	—
HAF black	25.0	25.0	—	—	—
MINS. CURE AT 141°C.	30	30	30	30	35
Elongation % (original)	450	450	760	660	670
Elongation after 1 week at 120°C.	200	230	600	480	520
Elongation after 2 weeks at 120°C.	120	110	410	300	360
Elongation after 3 weeks at 120°C.	90	100	320	250	300
Elongation after 4 weeks at 120°C.	50	60	180	120	150
Elongation after 8 weeks at 120°C.	—	—	90	50	50

Heat-resisting HD PCP Compounds

The results are given in terms of change in elongation and when this reaches 50% at break, it is considered that the compound is not satisfactory for use. The results in curve form are given in Fig. 1.

The superiority of the mixes containing white fillers is quite clear. Unfortunately their tensile characteristics do not really give sufficient margin of safety over the required 1,600 psi and certainly not in the case of the US figure of 1,800 psi. It is therefore, usually necessary to strike a compromise between the white filler and the black filler mixes.

White HD Mixes

There are sometimes demands for a white or coloured mix which is required to meet the HD clauses of BS 2899. This can be achieved with suitable fillers, although the margin of safety is not so great as with black sheaths.

Mixtures of talc, activated chalks and fine particle silicas give useful results. Promising results are also obtained with precipitated calcium silicate and a combination of some of these fillers is likely to give the best answer. It should be noted that in addition to producing a white mix, extremely good ageing characteristics are obtained.

With the above mixtures, tensile strengths of the order of 1,700–1,900 psi are obtained. Apart from the fillers, no different compounding techniques are required.

Flame Resistance

One of the main reasons for using PCP sheaths is for their flame resistance. PCP will burn, of course, but as long as the flame is self-extinguishing when the source of fire is removed, that is all that is required. In other words, a cable with a PCP sheath must not propagate a flame.

The test in BS 708 is essentially to impinge a flame at an angle of 45° from a Barthel burner, on a cable suspended horizontally. The flame is applied for five minutes, withdrawn, and the cable has to be self-extinguishing in 30 seconds and the total length of cable burnt is not to exceed six inches.

The standard types of HD sheaths given in this article normally comply with this specification although odd cases of failure have been known. However, it is possible to have the cable extinguished immediately on withdrawal of the flame by the use of suitable flame retardants. These need not be added in very great quantities, certainly not enough to significantly affect the mechanical properties.

Ozone Resistance

Ozone resistance is sometimes required with PCP compounds, although without special compounding they all have the feature. It can be improved, of course, by compounding (ignoring the use of antiozidants which should not be necessary in PCP) but the improvements are not very great.

Some typical results on a GP sheath (and PCP insulation) may be quoted. The tests were carried out in accordance with ASTM D 470 with an ozone concentration of 0.03% by volume, on Type C dumb-bells, stretched to an elongation of 10%.

After eight minutes at this concentration, rubber insulation and sheathing cracked badly and failed. SBR compounds failed in 15 minutes. After 72 hours the PCP mixes had not been attacked. It appeared that the test would have to continue for a considerable time at this ozone concentration so that it was increased to 0.18% by volume. The PCP compounds failed after 14 hours at this concentration, using the same samples which had already withstood the lower concentration for 72 hours.

It is quite clear from these results that PCP compounds have very good ozone resistance.

Ozone test equipment

Use of 'W' Type Neoprenes

It is widely believed (amongst consumers) with some justification that the tear resistance of 'W' type compounds is not as good as 'G' type compounds. Nevertheless compounds

complying with BS 2899 can be made quite readily.

The basic difference between the compounding of the two types, is the degree of acceleration required. A considerable amount of accelerator needs to be added to 'W' type mixes to give a tight cure. On 100 parts of polymer 0.5 parts tetramethyl thiuram monosulphide plus 0.5 parts DOTG plus 0.5–1.5 parts ethylene thiourea as well as 1.0 parts sulphur are required. Such cures are quite fast, the tears being a little inferior to equivalent 'G' type mixes, although the tensile strength tends to be better.

There seems to be little doubt, that if industry spends as much time developing 'W' type compounds as it did 'G' types, the results will be as good as, or better than equivalent 'G' types. Coupled with this will be the advantages of better storage and processing properties.

Other Considerations

The study of the use of PCP in cables is so involved that an article such as this can only touch on outstanding points. However, a number of other matters may be briefly considered.

Oil resistance is sometimes of importance. BS 2899 calls for 80% of the tensile strength to be retained after immersion in oil at 100°C. for 24 hours. Most compounds meet this requirement readily. Although on prolonged immersion, PCP swells considerably in oils, it does not disintegrate for a considerable period.

Exceptional moisture resistance is sometimes of importance. For general purposes normal PCP mixes are satisfactory. For better resistance a red lead type of cure is the only really satisfactory anwer.

Conducting PCP mixes are sometimes required, particularly in a certain class of cables for coal mines. The use of acetylene black still seems to give the best results, in spite of the host of other conducting blacks.

Conclusions

PCP has a large part to play in cable manufacture. It has served well in the past and will undoubtedly continue to do so in the future.

In spite of its comparatively long history, there is still much compounding work to be done, and polymer development. A better heat resistant polymer is required (up to Hypalon standards) coupled with the ability to maintain a flat cure/tear resistance curve. Type 'W' polymers must also be explored more fully.

Another field which may well pay dividends, is mixtures of PCP and other polymers. Hypalon is an obvious choice, but PCP can be blended with most synthetics to give varying results, some of interest.

Higher US Tyre Prices

Tyre prices should rise soon after a settlement of current negotiations between the major rubber companies and the AFL-CIO United Rubber Workers' Union, according to the Lee Rubber and Tyre Corporation chairman, Mr Albert Garthwaite. It is most likely this will happen in September and the increase should be 'at least' 5%, he said.

Plastic Industrial Fans

I.C.I. ACQUIRES 'MAREX' RIGHTS

MARSTON Excelsior Ltd., a subsidiary company of Imperial Chemical Industries Ltd., have acquired from the Hudson Engineering Corporation of Houston, Texas, the sole right to manufacture Hudson hollow plastic industrial fans, in the UK. The fans will be sold under the trade name 'Marex.'

Initially, the standard range will consist of four-bladed fans ranging from 6 to 14ft. in diameter. The blades of true aerofoil shape, are made of woven glass cloth and pigmented epoxy resin, laminated as a one-piece moulding. They are heat and corrosion resistant, will not shatter and are extremely light; a set of blades for a 10ft. diameter fan weighs 58lb.

Petroleum Products Plant

Further details of Petrolite Ltd. and the products to be manufactured by the new plant, now being installed by Blaw Knox Chemical Engineering Co. Ltd., are now available.

The company is a wholly owned subsidiary of Petrolite Corporation of St. Louis, Missouri, and will manufacture at Liverpool the major products of its parent company. These include Tretolite demulsifiers and de-salting chemicals, Kontol corrosion inhibitors and Solvo paraffin solvents. The plant will go into operation by the end of 1959.

Reinforcing Resins

Catalin Ltd. have announced a new range of resins for the reinforcement of natural and synthetic rubbers. The range is known as the 'Cataplas Series 900,' and arrangements have been made for the distribution of these resins in the UK jointly by Wilfrid Smith Ltd., London, and Hubron Rubber Chemicals Ltd., Manchester. Export sales will be handled directly by Catalin Ltd., Waltham Abbey, Essex.

Dr W. D. Scott and Mr R. F. Sammell have been appointed to the board of A. G. Spalding and Bros. Ltd., subsidiary and sports goods division of BTR Industries Ltd. Dr Scott is assistant managing director of the parent company and Mr Sammell recently joined Spaldings as general manager.

IRI Golfing Society

MANCHESTER SECTION

ON Monday July 21 the Manchester Section of the IRI Golfing Society held the Captain's Prize Competition at Withington Golf Club. The Captain —H. K. Mills—welcomed 40 members of the section to take part in the competition.

There was a three-way tie for the first prize, at a nett score of 69. J. L. Ferguson was the winner on the last six holes, from J. M. Ferguson, who was second on the last nine from E. Cheetham, Mr Cheetham being third. Mr R. N. Ferguson came next with a nett 70.

Everybody sat down to dinner in the evening and Mr H. K. Mills, in his capacity as captain of the Withington Golf Club, welcomed the members of the society. The captain wishes to thank the donors of other prizes given by members of the section, there being sufficient to give prizes to the following:

J. L. Ferguson ...	69	Winner
J. M. Ferguson ...	69	Runner-up
E. Cheetham	69	Third
R. N. Ferguson ...	70	Fourth
W. Jessop	74	Best gross
G. Betts	33½	First nine
G. Robinson	34½	Second nine

The following are thanked for donation of prizes: H. K. Mills, T. A. Wilson, G. Betts, S. Heywood, H. West, F. Savaage.

Plastics in Building

Registration forms are now available from the Secretary for the Plastics Institute Conference to be held at the Royal Institute of British Architects on November 19 and 20 1959 on 'The Influence of Plastics in Building.'

What makes the secretary smile?...

Finding a way of making a sizeable addition to profits—and without risk—is guaranteed to raise managerial morale. This particular company uses industrial solvents in a big way—expensive solvents that used to go to waste after they had done their job. Now, with a Sutcliffe Speakman recovery unit, they are trapped and brought back for re-use. Savings are substantial—sufficient to pay the secretary's salary from now to Doomsday. But solvent recovery is not merely a matter for the bulk user. Small-scale recovery with smaller capacity plant can be, comparatively, just as profitable. Tell us how much solvent you use and we will tell you what recovery can do for you. You'll probably be surprised how much you will save and how soon you will start to save it.

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Rubber Suspension Units

FOR NEW BMC CARS

THE rubber suspension units and rubber couplings featured in the new BMC cars—the Morris Mini-Minor 850 and the Austin Seven 850—are interesting not only from the design point of view, the design was by Moulton Developments Ltd., but also from the production aspect. The new Dunlop factory at Coventry at which the new suspension units are made uses rubber at the rate of some 24,640lb. a week. The processes are highly automated and the parts are produced to very fine limits.

Suspension Units

The tolerances to which the plant for the suspension units operates are probably closer than any which have previously been obtained with large volume production of rubber - metal bonded components. For example, the K modulus of the rubber compound is held to within ± 5¼% and the height of the deflected suspension unit is kept within ± .005in.

The metal parts are produced on a special press line, then degreased and shotblasted. After transfer to the solutioning room, they are placed on trays and immersed in boiling trichlorethylene to remove any residue from shotblasting and any contamination from the operatives' hands. The parts are next fed into a special plant which automatically sprays the appropriate faces with the two bonding solutions and then ejects them with solutions dried.

At this stage rubber blanks which have been cut to weight from hollow cylindrical extrusions, are placed on the prepared metal surface and the assembly automatically transferred to the moulding press line. After moulding, the units are moved on a high-speed conveyor into a final curing oven, closely controlled for temperature, through which they pass at a slow speed.

From this operation, the units are ejected on to a storage conveyor where they are matured for 24 hours. The units are automatically ejected from the maturing conveyor in the same order in which they were loaded and transferred to the bond-testing machines already described. The final operation is spray painting the exposed metal surfaces.

The entire sequence of manufacturing and testing operations is stringently controlled, with rejection of any units outside the narrow limits laid down.

The rubber cone spring component, basis of the suspension unit, consists of a natural rubber compound bonded between inner and outer metal cones. The spring is made by Dunlop under Moulton patents

Testing

The production plant automatically carries out a series of tests on every suspension unit made. Each unit has a stringent bond test in tension and then passes to an automatic performance testing machine. Here the unit is first measured for overall height and then deflected three times to break down moulding stresses. This is followed by deflection tests, where a test load to within ± ¼% is applied and the deflection measured; units which vary more than ± 2.8% from a specified deflected height are automatically rejected. In order to eliminate any initial 'creep' effect during the test, the mechanism ensures that the measurement is taken between the 28th and the 32nd second after the load has been applied.

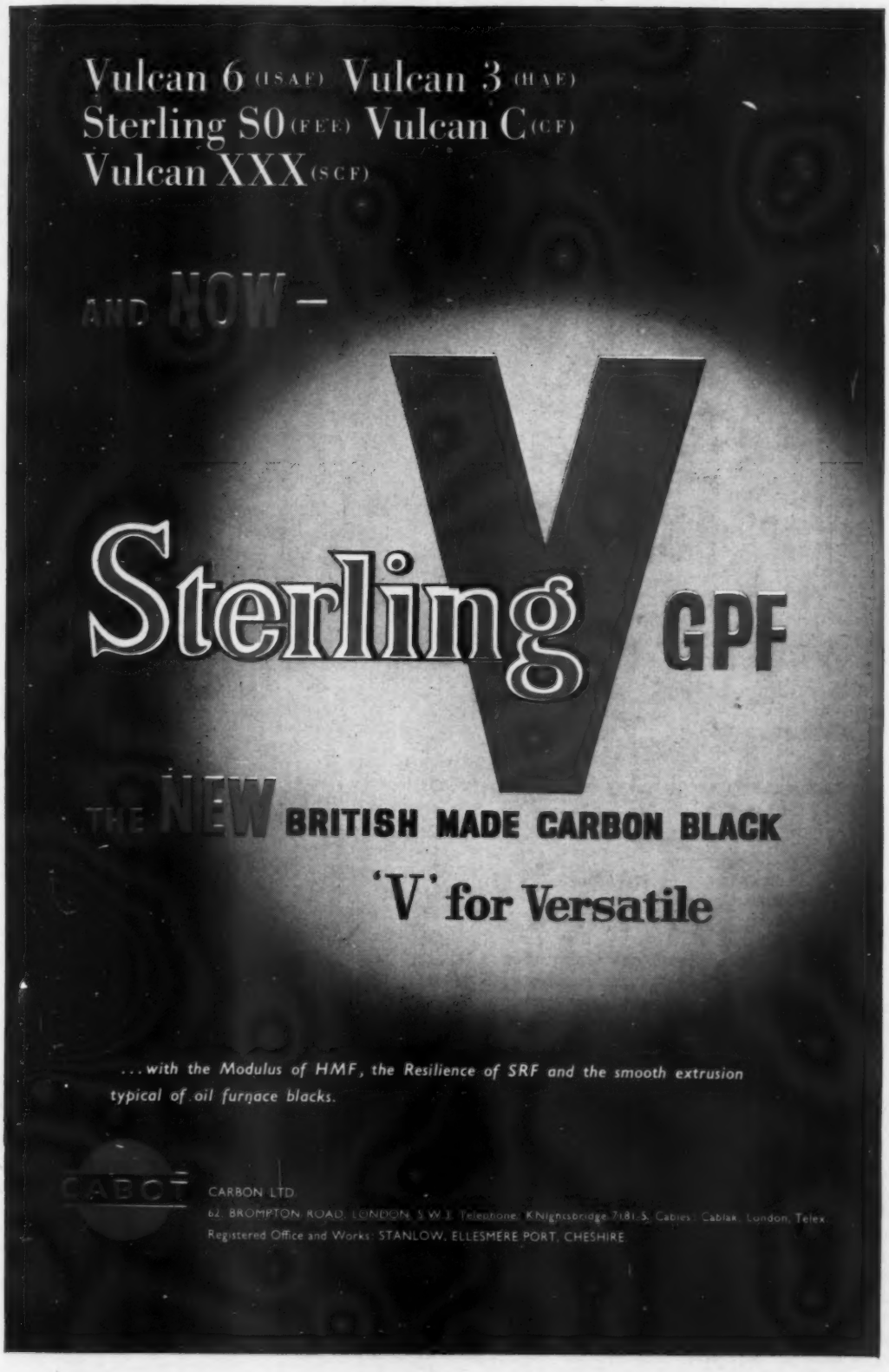
The next process is a machining operation. After loading to the test figure, the bottom of the outer metal flange is machined so that the height of the deflected unit is within ± 0.005in., irrespective of any variations in the rubber part. As with the previous test, in order to eliminate initial 'creep' effects, the machining operation is completed between the 28th and the 32nd second after the load has been applied.

As a final test, a percentage of the units are re-checked for loaded height on another machine, to ensure that all the previous operations have been carried out correctly.

Long Life

The main advantages of the rubber suspension units are stated to be:

1. that as they deflect the stresses are uniformly distributed throughout the rubber, thus giving them a longer life than that of metal leaf springs;
2. they do not require any lubrication;
3. that because the rubber compound provides an appreciable amount of damping, there is far less strain on the conventional shock absorbers which can also be expected to last longer;
4. excellent handling and ride characteristics which are unaffected by the wide variations in load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resulting from a full-sized body space in a very light vehicle such as the new BMC car;

5. the effective absorption of high frequency vibrations ensuring that the occupants of the car have a smooth ride over rough roads;
6. easier and cheaper a replacement should it ever become necessary to replace the rubber units, which is in itself an unlikely occurrence.

Coupling Units

In the production line for the coupling units, the nine metal parts are also made by conventional methods on a roll-feed press, but the moulding operations are quite different. The metal parts are loaded into single cavity moulds mounted at eight stations on a rotary table, which indexes intermittently. These stations comprise unloading from the conveyor, mould opening and stripping, mould cleaning, two stations for mould re-loading, mould closing, rubber injection into the mould and transfer to the main conveyor. Seventy-five moulds are in cure at any given time.

After the moulding and curing operations, the coupling units are allowed to mature and then bond-tested in a machine which applies a torsional load to each arm in turn. The angle through which each arm should turn is known and acts as a check on the hardness of the rubber compound. The remaining operations include trimming off the rubber flash, spray painting and lettering.

It can readily be seen that both the manufacturing and the testing operations represent a high degree of automation. The specification limits called for are very close and the fact that all units failing to meet them are rejected, ensures that a very high standard of uniformity is maintained.

The design of these units is unique in that it provides a high torque capacity from a relatively small diameter, and no maintenance or lubrication is required. The torsional flexibility of the units results in exceptionally low road speeds being possible in top gear without any roughness; the transmission shaft is able to move freely to accommodate the suspension movements.

The rubber-metal coupling in the transmission unit

PI Awards

The Council of the Plastics Institute has made the following awards:

Fellowship: J. B. Cameron, B.Sc., A.R.I.C., A.P.I., L. N. Phillips, A.R.I.C., A.P.I., S. H. Pinner, B.Sc., Ph.D., F.R.I.C.

Associateship: C. L. Child, B.Sc., Ph.D., N. Evans, F.R.I.C., H. R. Everard, A.C.T.(Birm.), A.R.I.C., E. G. Hancock, M.A., M.Sc., F.R.I.C., R. F. Hill, B.Sc., A.C.T. (Birm.), A.R.I.C., F.C.S., L. W. Turner, B.Sc., A.R.I.C.

FBRAM TECHNICAL COMMITTEE

MEETING AT ISR PLANT

SOME months ago Mr D. A. Bennett, director and general manager of the International Synthetic Rubber Co., suggested that the Federation's Technical Committee might find it convenient to hold one of their three-monthly meetings at Fawley and to combine it with a tour of the plant. This combined operation took place recently.

Of the fifteen committee members attending the meeting a dozen stayed at local hotels on the previous evening, and with the Federation director and secretary were entertained to dinner at the Montagu Arms, Beaulieu, by Mr Bennett, Mrs Bennett and a number of the ISR staff.

After the committee meeting on the following day, and a buffet lunch in the boardroom, Mr Bennett spoke to his guests about the foundation of the Company. It had required some £15 million to put the synthetic rubber industry into operation. In 1956 some of the larger tyre manufacturers had decided to underwrite the project and had formed themselves into a consortium for this purpose. The SB plant could not be considered in isolation from its raw material suppliers. Butadiene and styrene plants had accordingly been put up by outside interests against firm contracts for their materials, and the Finance Corporation for Industry had found a large proportion of the money for the plant itself. The equity was held by the tyre manufacturer members of the consortium who had supplied some £3 million of capital, none of them having a majority holding.

The company had recently started to make several new grades of rubber; material for the shoe-soling industry and high solids synthetic latex would probably be available shortly. They were trying to achieve a technical service for their customers which would fully meet their requirements, and in this connexion he would much appreciate any suggestions the Technical Committee of the Federation would care to make on ways on which ISR could help them.

Mr F. H. Puxty, chairman of the Technical Committee, expressed his own and his colleagues' thanks for the Company's hospitality. A general discussion then took place on the various points touched on by Mr Bennett.

Mr Stanley E. Clotworthy has been appointed a director of Metal Closures.

Electrical Aids in Industry *Data Sheet* **No. 6**

Lighting-1

Good lighting affects productivity in three ways, (1) by directly increasing the speed of working and reducing errors and wastage, (2) by improving overall factory efficiency through better supervision and housekeeping, (3) by providing better working conditions, thus improving labour relations and avoiding frequent changes of workpeople.

It is not possible to judge by the eye alone whether the lighting in any factory is good enough to serve these purposes because the eye has a tremendous range of adaptation (vision of some kind is possible within an illumination range of 1,000,000 to 1) and is hence an unreliable measuring instrument. Severe mental and eye strain or unconscious slackening of working speed may occur under lighting which *appears* to be adequate.

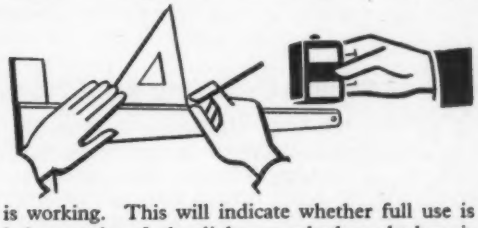
The only reliable way to appraise factory lighting is to conduct a lighting survey using a lightmeter, an inexpensive instrument which measures the actual illumination available. These figures can then be compared with official recommended values for the various tasks.

Lighting Survey

A methodically conducted lighting survey is the first step towards achieving good productive lighting. The average artificial illumination at working height should first be measured. This requires a number of readings at various positions relative to the lighting fittings, particularly beneath and between fittings and by the wall. The average of the readings should then be compared with the illumination values recommended by the Illuminating Engineering Society. The following is a general guide to illumination requirements.

NATURE OF WORK, PROCESS OR MATERIAL	ILLUMINATION LUMENS/SQ.FT.
Rough or routine work. Large detail. Medium to light material of good contrast.	7
As above, but work rather more skilled or critical.	10
Ordinary work usually involving workers' inspection. Medium detail and contrast.	15
Fairly critical work, fairly small detail or poor contrast.	20
Skilled work, small detail or dark material.	30
Fine or critical work, very small detail, very poor contrast or very dark material.	50
Very fine exacting work.	100
Minute work.	200

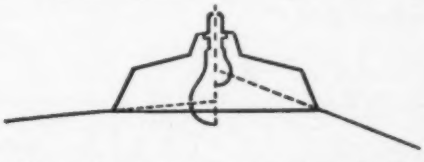
In addition, readings should be taken at selected working points with the lightmeter so placed that it measures the light on the work while the operative



is working. This will indicate whether full use is being made of the light or whether shadow is obscuring part of it.

Glare

Any direct light on the eye tends to reduce its sensitivity—thus reducing the power to see. Increasing the intensity of the light source may



therefore not improve matters unless care is taken to avoid glare either by correct positioning or by the use of correctly matched reflectors and lamps.

Walls and Ceilings

Certain surfaces and certain colours absorb light and therefore do not make the best of a light source; others reflect light and, so to speak, feed back on to the work a portion of the lighting which would otherwise be lost. Bright walls, moreover, have a good psychological effect which makes for contented —and therefore productive—operatives.

Shadows

Unnecessary shadows may seriously slow down work and also cause accidents. Lightmeter readings should always be taken under conditions exactly similar to those obtaining while work is going on. The operative himself may mask his work, an overhead crane or a heavily loaded conveyor belt may periodically obscure a light fitting, or a dust-laden atmosphere may reduce the designed lighting values.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books are available on electricity and productivity (8/6 each or 9/- post free)—"Lighting in Industry" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity including one on industrial lighting. Ask for a catalogue.

Advertisers Announcement

VIEWS and REVIEWS

Ozone Cracking Inhibitors

OZONE cracking, especially in tyres, is a subject which, to judge by the increasing publications on the subject, is one which deserves close attention; its importance and the complexity of it, is further confirmed by a study entitled 'Accelerated Testing of Ozone Cracking Inhibitors,' recently published in *Rubber World* (1959, *140, No. 2,* 243-251). The paper, by F. B. Smith and W. F. Tuley (Naugatuck Chemical Division, United States Rubber Co.) was presented before the Division of Rubber Chemistry of the ACS, held at Chicago, September 1958.

Methods of Test

In the Naugatuck research, both accelerated and unaccelerated tests were used to screen and select commercial ozone cracking inhibitors. These included both static and dynamic tests. The accelerated static tests were run according to ASTM D 1149-55T both in the Mast box[1] using 50 p.p.h.m. of ozone, and in the 'Crabtree' box[2] using 25 p.p.h.m. of ozone.

The unaccelerated static tests were run according to ASTM D 518-44 on the roof of the plant at Naugatuck, and on the roof of the plant at Los Angeles. The dynamic tests were run on the roof at Naugatuck on a Naugatuck-Holbrook machine (*described in the paper*) and at Los Angeles on an outdoor weathering wheel (*also described*).

In addition to the tests on vulcanized samples a chemical screening test (viscosity degradation run on crude styrene-butadiene rubber in solution) was employed (*cf. details in original*).

Nature of Antiozonants

The antiozants tested were as follows:

Chemical Nature	*Abbreviation*
a. N-phenyl N'cyclohexyl p-phenylene diamine	P.C.p.p.d.[3]
b. 6-ethoxy-1, 2-dihydro-2, 2, 4-trimethyl quinoline	E.D.T.m.q.[4]
c. N, N'-di-(1-ethyl-3-methyl-pentyl) p. phenylene diamine	$(EMP)_2$p.p.d.[5]

Discussion

Although this study includes 21 figures and three tables, its somewhat complex nature may be realized by studying the details now advanced. Comment in the *Rubber World, inter alia,* referred to the authors' conclusion re the use of 'boxes' as being 'well worth noting': '. . . the antiozonants tested were effective against normal atmospheric concentrations of ozone in the absence of wax, although in accelerated tests in ozone boxes the degree of effectiveness of chemical ozone cracking inhibitors was largely masked. It is stated that ozone box exposures do not distinguish between certain compounding variables as used in this work.'

[1]Mast Development Co., Inc., Davenport, Iowa.
[2]Described as 'Modified equipment, not commercially available.'
[3]Flexone 6H,[2] Naugatuck Chemical Division.
[4]Santoflex AW, Monsanto Chemical Co., Akron, Ohio.
[5]UOP-88, Universal Oil Products Co., Des Plaines, Illinois.

Conclusion re Tyres

The authors' *Conclusions* (*cf.* 1 *to* 8, *page* 251) include the following:

'7. The outdoor dynamic cracking test and the weathering wheel test permit the tyre compounder to define the ratio of equivalence between chemical antiozonants as well as to provide an insight into the adequacy of his compounds against ozone cracking. Of the laboratory tests used at Naugatuck, the dynamic outdoor test seems most relevant to actual tyre performance.'

RD Spring Meeting

In the issue of *Rubber Age* for June 1959 first impressions relate to two friends of many years standing, namely, F. H. Banbury and H. A. Winkelmann; and, next, to something new, namely a chlorosulphonated rubber, 'Hypalon 40.'

All three of these features are 'highlighted' in the issue of *RA* quoted.

To begin with, however, be it placed on record that the coming together of these incidents took place at the Rubber Division (ACS) Spring Meeting, the 75th in number, at Los Angeles, over the period May 13 to 15 of the present year. This meeting 'featured the presentation of 37 technical papers'. . . and it was stated at the meeting that Dr Fernley H. Banbury had been selected as the Goodyear Medallist for 1959.

The Goodyear Medallist

It was announced at the Divisional business meeting that Dr Banbury would present his Goodyear Lecture at the International Rubber Conference which, as readers of *RJIP* will know, is to be held in Washington, D.C., in the autumn of the present year.

On p. 465 of *Rubber Age,* there appears a comprehensive biography (and excellent portrait) of the Medallist, which, I feel sure, will be read with much interest. However, I may mention here—although it will be known to most rubber (or must I now say 'elastomer'?) technologists, that Banbury was born in Cornwall, and proceeded to the United States when a young man. His is a 'household' name in the industry, and will always be known and remembered in connexion with the 'Banbury Mixer.' He received, *Rubber Age* mentions, a Modern Pioneer Award from the National Association of Manufacturers in 1940, and in 1948 Purdue University awarded him the honorary degree of Doctor of Engineering.

Dr Winkelmann

In the *RA* chronicle of the RD meeting, Dr H. A. Winkelmann is depicted in a group of presenters of 'Invited papers to the symposium on ozone effects.' To me, Dr Winkelmann—whom I had the pleasure of meeting in the United States many years ago—will always be associated with the publication of either the first (so far as I know), or one of the very first, of works of reference relating to rubber, which, as Dr W. C. Geer

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

put it in the Introduction, embodied two essential characteristics, namely those of 'completeness and accuracy.'

I refer—I add for the benefit of what is known as the 'younger generation'—to 'The Systematic Survey of Rubber Chemistry' by Clayton W. Bedford and H. A. Winkelmann (published in 1923 by the Chemical Catalog Co.).

In his appreciation of 'Bedford and Winkelmann,' Dr Geer added a third 'necessary feature,' and one which may even at the present date, when the annoyance of 'woolly' or deficient indexing, and the like, is not unknown, be recommended for the consideration of the perpetrators, namely: 'references should expound something of the subject-matter contained in the original articles. Title and author indexes are of little value to the research chemist unless they suggest the contents of the text. Because of the enormous amount of literature, hundreds of articles must be read in the search for information.' and:

'To make references available by reliable, though brief, analytic abstracts and by subject indexes in detail, is an achievement and a high service to investigators.

'This book fulfils these requirements. . . .' And so Dr Geer: it seems strange that his words of wisdom were written some 35 years back! They are as useful today as they were then.

(*Envoi:* In any case, I take this opportunity of sending my best regards and congratulations to Dr Banbury, and to Dr Winkelmann.)

'Hypalon 40'

The third item in the current issue of *RA* to which I wish to draw attention today is what appears to me to be an important announcement by Messrs Du Pont, namely that relating to 'A new chlorosulphonated polythene polymer, designated "Hypalon 40" synthetic rubber.'

According to our contemporary the new material is said to offer greatly improved processibility over other Hypalon types, producing vulcanizates which 'exhibit outstanding physical and chemical properties.'

The improvements referred to have been gained without sacrificing the desirable qualities which characterize other Hypalons, *e.g.* resistance to deterioration by oxygen, ozone, heat and weathering, and outstanding colorability and colour retention, the company states. While the new rubber is said to offer 'complete' resistance to ozone, Hypalon 40, because of its high solution viscosity, 'is not applicable to solution applications.'

Processing

In the description given of 'Hypalon 40' it is stressed that 'The excellent processing characteristics are said to give greatly improved processing mobility. . . .' Mixing time on laboratory tests is said to be 30 to 40% less than for other Hypalon polymers. Indeed 'The high hot strength, release and smoothness characteristics make the rubber ideally suited for calendering at various gauges and temperatures.' In confirmation of this it is mentioned that 'In one plant on a 60in. calender it was found practical to produce a two-mil film which could be removed by one man, without distortion or tearing.' (*Cf.* photograph on p. 467 of *Rubber Age* description: 'The photograph shows the clarity of the film.')

Applications

With regard to service applications, and the preliminary testing involved, the following quotation seems to me especially interesting:

(a) 'The most extensive field testing programme ever undertaken by the elastomer testing laboratory of Du Pont has produced excellent results.'

(b) 'Thirteen different companies making hose, moulded goods, wire and cable, industrial rolls, coated fabrics, and complicated extrusions, have employed the polymer in trials with uniformly good results, not only in processability but also in characteristics of the final product. The rubber sells at 70 cents (*i.e. about 4s. 11d.*) per lb.'

Notes

The latest issue to reach me of Messrs Cabot's *Carbon Black Abstracts* (No. 1, vol. 8: January-March 1959), covering some 39 pages (*circa* 11 x 8in.), which, as it covers abstracts relating to 'blacks' other than those of the issuing firm, may be taken as some indication of the interest taken in, or of the commercial importance, of the blacks. The Abstracts number 180, and a rough analysis (based on the *Contents* Table) *in pages,* shows the following: *Production and Processing*—9; *Applications:* Rubber Black—15; Colour Blacks—2; CB in Plastics and Synthetic Resins—2½; Electrical Applications—1¼; *Miscellaneous Uses*—3½; *Fundamental Properties*—4½; *Economics, Statistics and News*—¾.

PHILIP SCHIDROWITZ

Drying and Mixing

NEW PROCESS FOR RAW RUBBERS

A NEW process, which permits the mixing and dewatering of raw rubber in a single operation, is reported from America. The process is understood to employ a special Banbury mixer, in which the drying of the rubber, as precipitated from the latex, is carried out by intense shearing action, after initial dewatering by the pressure of the ram, which forces some of the water out of the slurry. The shearing action of the Banbury rotors develops high internal heating, so that the water in the rubber is heated above its boiling point, and is driven off as steam. While this is taking place, compounding ingredients such as carbon black or oil may be incorporated. The process is claimed to be successful for the processing of both natural and synthetic rubbers and is especially applicable to emulsion-polymerized synthetic rubbers. Savings of £2–£3 per ton in synthetic rubber manufacture are claimed to be obtainable. The inventor of the process is Dr P. J. Dasher, and The Patent and Licensing Corporation, a subsidiary of the Flintkote Co., New York, is licensing it.

Dr Dasher, as assignor to the Dasher Rubber and Chemical Co., has been issued with US Patent No. 2,854,426, which was published on September 30 1958, and which relates to a process of milling synthetic rubber coagulum containing water.

A further item of interest is that the Farrel-Birmingham Co. Inc., is advertising a Banbury mixer for dewatering, which is claimed to produce 6,000lb. of dry rubber per hour. It is believed that with larger Banburys output may be increased to 12,000lb. per hour.

Questions Corner—81

(Second Series)

343. It is sometimes necessary to colour polythene. What are the most suitable methods and materials?

344. What types of machines are used for pre-forming in the production of glass fibre reinforced plastics? How is this done?

345. Why are plasticizers used in polyvinyl chloride formulations?

346. Of the various methods of polymerization one is known as 'pearl' polymerization. What is this?

(Answers next week)

Answers to Questions Corner—80

339. Generally, cellulosics may be considered as plastic materials derived from cellulose, and the following are the main types: *a.* Regenerated cellulose. If one dissolves cellulose by chemical reaction and then precipitates it out of the solution to give a material which has essentially the same chemical structure, but in a different form, such as film or fibre, it is said to be regenerated cellulose.

b. Cellophane. If cellulose is converted to alkali cellulose and then treated with carbon disulphide, a water soluble xanthate is formed. If this viscose solution is extruded into an acid solution a clear transparent film can be formed which is known as cellophane.

c. Rayon. This is now accepted as a generic name for fibres and yarns composed of regenerated cellulose. There are three main types—viscose rayon, cuprammonium rayon, and cellulose acetate rayon.

d. Cellulose esters. If cellulose is dissolved by chemical reaction and an ester formed, a new compound may be recovered by precipitation and can be dissolved, compounded, cast or moulded into its final form. Some of these are nitrocellulose, cellulose acetate, cellulose acetate butyrate, and cellulose propionate.

e. Cellulose ethers. Cellulose can be treated with strong caustic to form ethers, amongst which are: Methyl cellulose, hydroxyethyl cellulose, carboxymethyl cellulose, carboxymethyl hydroxyethyl cellulose. They are being used for solution purposes and are soluble in varying degrees in water. Ethyl cellulose is available as soluble flake, moulding powder or sheet.

340. Di - 2 - ethylhexyl - phthalate $C_6H_4(COOC_8H_{17})_2$ is more commonly known as DOP and is a colourless to pale yellow, almost odourless viscous liquid of high boiling point and of exceptionally low volatility.

It is miscible with common organic solvents, *e.g.* alcohol ketones and both aliphatic and aromatic hydrocarbons, but is not miscible with water. It is compatible with a large number of resins and polymers including cellulosics, styrene polymers, polyvinyl chloride, and co-polymers, nitriles, etc. It is partly compatible with alkyds, cellulose acetate butyrate, polyvinyl acetals, polyvinyl acetate and shellac. It is not compatible with cellulose acetate.

As mentioned above its usefulness is its low volatility and retention at high temperatures, low solubility in water, good stability to heat and light, excellent electrical characteristics. This latter property has led to its extensive use in insulating compounds.

Di-2-ethylhexyl-phthalate alone is not compatible with cellulose acetate but may be used in conjunction with plasticizers that are in themselves compatible with the acetate, *e.g.* dimethyl phthalate, and thus yield a plasticized compound more resistant to evaporation of the plasticizers.

It is used extensively with polyvinyl chloride and the quantity varies from a few % to 100% or more, as in the case of plastisols, according to the requirements of application. Its excellent electrical characteristics has led to its use in insulating compounds, and it may be used with other plasticizers and extenders, *e.g.* Butyl acetal ricinoleate and tricresyl phosphate, which are added to impart increased low temperature flexibility or flame resistance, or to lower the processing temperature.

With polyvinyl acetate it is not recommended as the sole plasticizer, only one part of the plasticizer being compatible with nine parts of the acetate. It can, however, be used in conjunction with DBP and DMP, the amount used depending on the low temperature flexibility and retention required in the final product.

341. When cellulose triacetate is partly hydrolysed it becomes insoluble in chloroform but is soluble in acetate. This is used in the dry spinning of cellulose acetate fibres. The acetic acid yield on hydrolysis is about 54% with an intrinsic viscosity in acetone of about 1.6.

The solvent used to dissolve the secondary acetate may be a mixture of 95 parts acetone and 5 parts water (BP 19,930) and 20-30% acetate, by weight (BP 210,108). The acetate dissolves slowly and usually takes about 24 hours.

If a dull yarn is required titanium dioxide pigment is added, and for a black fibre carbon black may be added at the solution stage. Both pigments must be of fine particle size so as to pass the jets. The solution is then filtered to remove incompletely acetylated particles and gels, and de-aerated. If it is filtered as a hot solution it will de-aerate sufficiently on standing.

The filtered solution is then fed to metering pumps, similar to those used in viscose spinning, through a jet filter and to the jet. The number of holes in the jet determines the number of filaments in the yarn. Filaments are passed through a spinning cabinet which is heated with hot air which evaporates practically all the hot solvent.

342. As a general rule, monomers which are only slightly soluble, or completely insoluble, in water are used for pearl or suspension polymerization. If, however, the solubility of the monomer is too great, electrolytes which have a salting-out effect may be added, *e.g.* alkali salts of strong acids, and they are suitable for the pearl polymerization of acrylic and methacrylic acids, acrylonitrile, etc. (GP 749,016).

Mixtures of different monomers may also be co-polymerized in suspension where a monomer which has a low solubility acts as an extracting agent for the second and more soluble monomer (GP 907,827; 912,866).

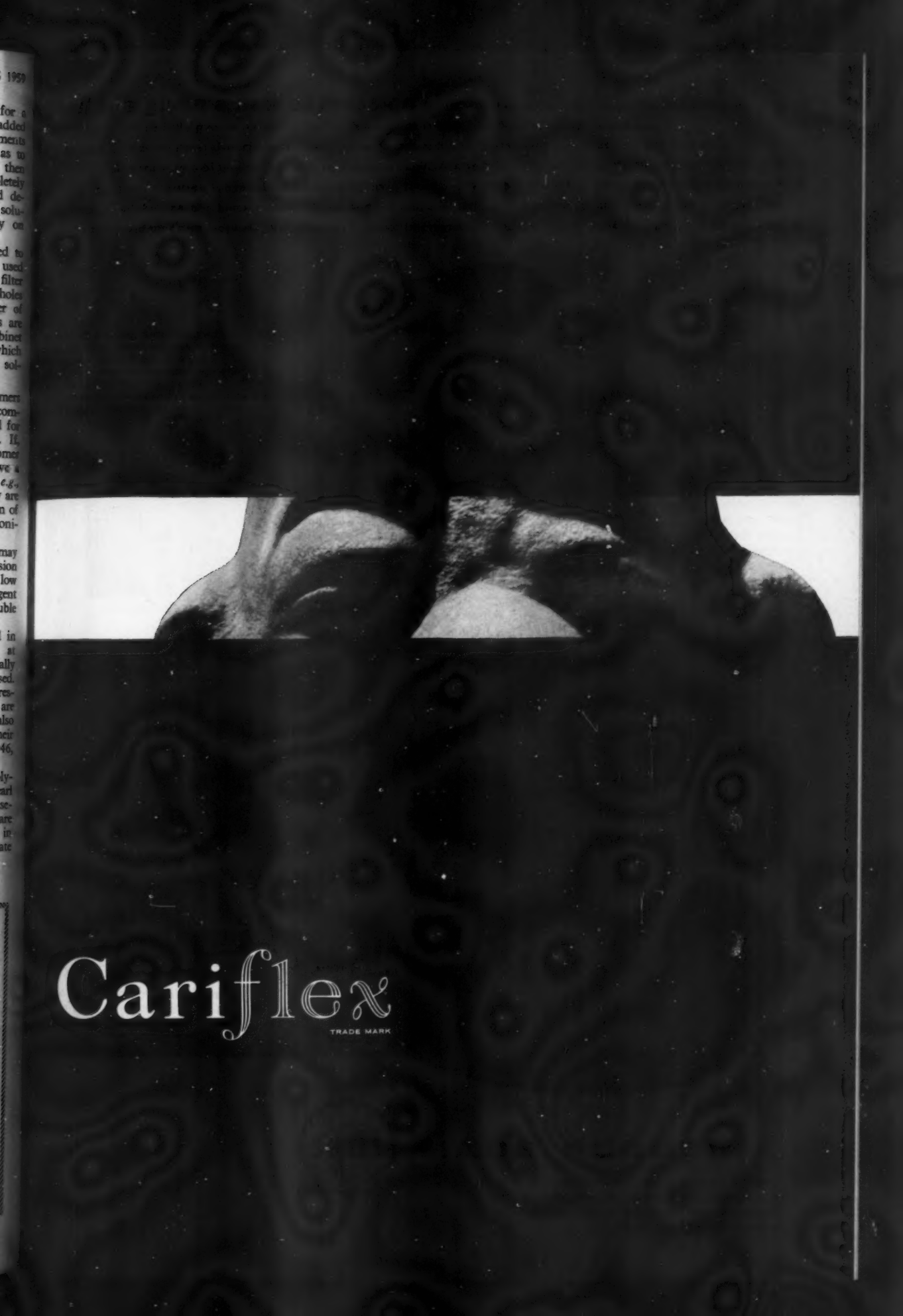
The majority of monomers used in pearl polymerization are liquids at normal temperatures but some normally gaseous monomers may also be used. Bombs or sealed autoclaves under pressure are used. Monomers which are solids at normal temperatures may also be used by heating them above their melting points (Mod. Plast. Nov. 1946, *24*, 158).

Instead of a monomer partially polymerized materials may be used in pearl polymerization and is particularly useful when beads of large diameter are required. It has been found useful in the preparation of polyvinyl acetate beads.

(More questions next week)

Polly Ester Says . . .

'Gum resins—plastics for making false teeth'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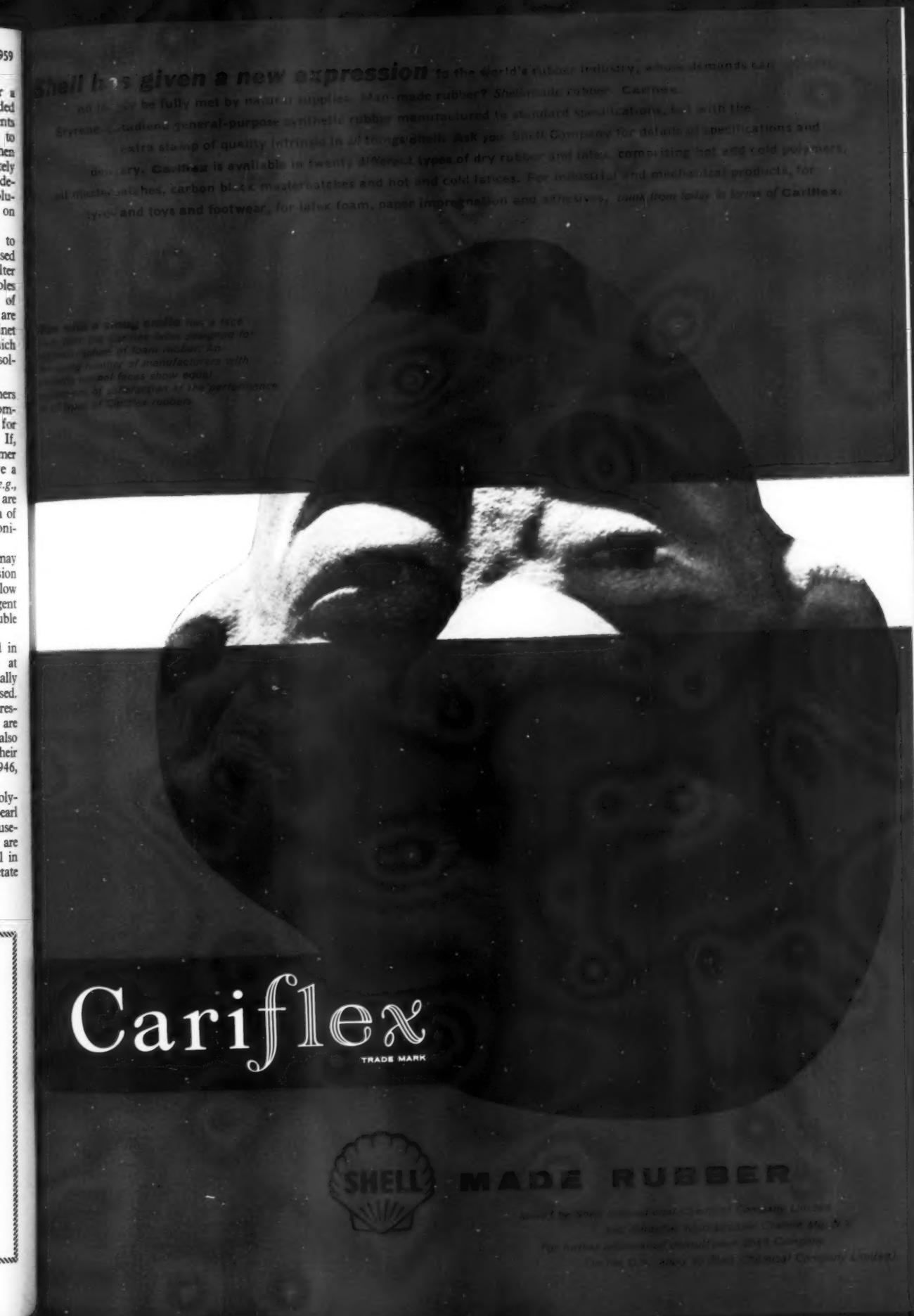
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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

A VERY odd but interesting article appeared the other day in one of the Midland's daily newspapers from its industrial correspondent. Leading off with the heading 'The Stigma of "Ersatz" no longer exists.' and with a secondary heading 'Remarkable expansion of the plastics industry,' the writer went on to say that since the Second World War ended a tendency in the earlier days to dismiss rather contemptuously as 'Ersatz' most synthetic materials, has finally worn off.

I should think so too! But where has this cove who writes such things been during the past eight or ten years, and where is he now, when he blandly remarks that 'plastics' are no longer regarded merely as substitutes, and even such conservative old-time rivals as workers in metal and wood are beginning to accept them as equal partners in a spirit of peaceful co-existence?

A Future Lord Mayor?

I am still catching up on some of the news which for reasons we all understand had recently been by-passed. One item is that at a recent meeting at Guildhall of a Common Hall consisting of those citizens of London who are liverymen of the guilds, with the Lord Mayor presiding, two new sheriffs for the City of London were chosen. With 'one voice,' the liverymen elected Mr Hubert Pitman and Mr Cyril Derry who will take office at Michaelmas. In due course, I suppose, they are both destined to be Lord Mayor, although there are probably a dozen more who have held the sheriff's office, but have not yet got to the chair of chief magistrate.

Mr Derry is the one who more particularly interests us because he is a prominent figure in the City companies, his guild being the Horners, so closely linked nowadays with the plastics industry, and to a lesser extent with rubber. The new sheriff has already been Master. A Londoner by birth, he is chairman and managing director of the family business of Ambrose Wilson Ltd., and chairman of Basett-Lowke Ltd. He is also chairman of Stephen Leynhan Ltd., and, incidentally, he is or has been vice-president of the Institute of Amateur Photographers. Mr Pitman, the third in descent from grandfather and father to be a member of Common Council, is an insurance broker and a member of Lloyds.

Plastics Abroad

It is true enough, as we have seen, that plastics in Britain flourish, but apparently they do also elsewhere. Output of raw materials and plastic goods in India, for example, has gone up four times during the past five years, says the Minister of Commerce and Industries. Addressing a plastics convention in Calcutta, he added that in the third five-year plan starting in 1961 output is expected to increase another five-fold. It is now at the rate of 25,000,000lb. a year, and it seems to me that the variety of Indian output is quite considerable as it is in Great Britain.

Reuter says that hundreds of Australia's kangaroos will soon be hopping around in plastic collars. It is all part of a survey undertaken by the Wild Life Section of the Commonwealth Scientific and Industrial Research Organization. Little is known of the kangaroo's habits, and the collars, marked with distinctive symbols in reflecting tape, will enable scientists to identify the kangaroos by spotlight at night.

A. J. BARRETT, formerly I.C.I. Heavy Organic Chemicals Division secretary, has been appointed secretary of the Plastics Division in succession to Mr S. P. Thompson, who has resigned from the company to settle permanently in New Zealand

Semtex Appointment

In view of the rapidly expanding activities of Semtex Ltd., it has, I am informed, been decided to

NORMAN DANIEL

broaden the management of the company, and Mr Norman Daniel has been appointed assistant general manager. Mr Daniel, who has had wide industrial experience in India and Australia, as well as the United Kingdom, was educated at Coopers' Company's School and took a first-class honours degree in chemistry at London University. He is a Fellow of the Royal Institute of Chemistry.

Board Changes

Mr Thomas H. Miller has been appointed a director of the Rubana Rubber Estates in place of Mr Albert H. Throssell, who retired by rotation at the recent annual meeting and did not seek re-election.

Another change, this time on the chemical side, concerns Mr D. C. M. Salt and Mr J. M. Kershaw. Mr Salt has been promoted director of sales and Mr Kershaw of development and market research of Monsanto Chemicals.

One word more about the departures. Many people will have heard with regret that, owing to indifferent health, Sir Richard Rankine has been compelled to resign from the board of Rubber Plantations Investment Trust Limited, after a considerable period of service. Sir Richard is an old Colonial servant in various parts of the world, and is now in his eighties. He actually

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started his career in Fiji so long ago as 1894, and is a former Governor of Nyasaland, and British Resident for the Zanzibar Protectorate. He was made a K.C.M.G. in 1932.

And a word about an honour. Lord Ogmore, better known to many of us, and certainly better recalled, as Sir David Rees-Williams, for so long a considerable figure in Malaya, has been highly recognized by the ruler, Taunku Sir Abdul Rahman, in his birthday honours list. He becomes a 'Dato,' the Malayan equivalent of Knighthood 'for services in connection with the negotiations for independence.' For nearly 30 years he has been associated, in one way or another, with the law, industry and politics, in South-East Asia.

Retirement

The managing director of Styrene Products (an associate of Shell Chemical Co. Ltd.), Mr P. C. Chaumeton, has retired. At a luncheon given in his honour, Mr L. H. Williams, managing director of Shell Chemicals and chairman of

P. C. CHAUMETON

Styrene Products Ltd., spoke of Mr Chaumeton's invaluable work with the company.

Mr Chaumeton has been connected with the development of the plastics industry since its early days. After taking his B.Sc. at Leeds University he served with several firms, becoming works manager of Lansil Ltd., and subsequently commercial manager of the same firm. In 1944 he joined the board of Erinoid Ltd. and has been managing director of Styrene Products since 1950 and from 1952 to 1955 he was a director of Petrochemicals Ltd. His association with Shell Chemical Co. began in 1955, the year in which Petrochemicals and its subsidiary, Styrene Products, became associated with Shell Chemical Co. Mr Chaumeton will continue to be actively associated with Erinoid Ltd. as deputy chairman.

Rubber and Plastics in South Africa

NEWS OF FIRMS AND PRODUCTS

ACCORDING to the mayor of Umtali, Southern Rhodesia, that town has been chosen as the site of the factory the British firm of rubber proofers, Ferguson Shiers, have decided to erect in the Federation.

Shoes

Meshcraft Sales (Pty.) Ltd., Johannesburg, are maintaining a production rate of 240 pairs an hour for the plastic shoes they are manufacturing by the injection moulding process. This company holds the sales franchise for Africa south of the Sahara for such footwear. The company states that the shoes are being moulded in one piece as a result of new applications in the use of PVC.

Laminated Plastic Furniture

Kaigor Manufacturing Co., P.O. Box 157, Fordsburg, Johannesburg, are finding that there is a strong demand in South Africa for laminated plastic furniture. The range includes bedroom suites in two-tone colours and dining room suites. The company is offering a circular table, the first in South Africa that has been incorporated in a plastic laminate dinette. Kitchen units are being made in the same material.

Swedish Import

Perstorp Panels, the decorative plastic covering material made by Skanska Attifabrieken A.B., Perstorp, Sweden, have been introduced on the South African market, and as they are available in a wide choice of colours and wood grains it is expected that they will enjoy a very good demand in this country, especially as they are guaranteed durable.

Glass Fibre Sheeting

Rudolf Glass, 4 Banfield Road, Industria North, Johannesburg, are offering a translucent glass fibre sheeting sold under the brand name of Plasticlair, which is suitable for roofing and other applications. It is being made in widths of 3ft. to 6ft. and in a variety of colours, in rolls up to 300ft. in length.

Nylon Cordage

Ropes and Mattings, Ltd., P.O. Box 3, Jacobs, Natal, are producing Truflex nylon cordage suitable for use as plough ropes, lashings, wash lines and a variety of industrial uses. When necessary it can be obtained in very long coils. Not only is this cord available in the three-strand rope but also in the basket and solid braided cording.

Rubber Goods

The Wayne Rubber Co. (Pty.) Ltd., 219 South Coast Road, Durban, are making a number of new items in general rubber goods stocked by hardware dealers, such as watering-can roses, tap swirls to prevent splashings, door stops and wedges. These can be obtained either in black or in a range of colours. This firm also make rubber feet for chairs, rubber pastry knives, flush pipe connectors, soap savers and a rubber labatory brush. A variety of rubber mats are also available from this factory.

Glass Fibre Boat

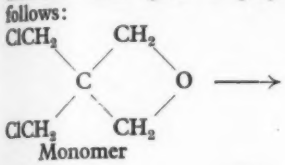
South African Bonded Fibreglass, Prestige House, Alfred Street, Cape Town, are making a 180lb. 1[illegible]ft. runabout boat capable of considerable speed, as the hull is finished with a perfect planing surface and the two non-trip chines run whole length of the hull, so that cornering can be done safely. This craft, the Swish, has a glass-smooth hull, so that in all it has a particularly attractive appearance. Another of the boats moulded by this firm is the Kingfisher, a 12ft. fishing dingy, which has been enjoying a good demand from many of the pilchard and other fishing companies operating off the Cape coast. It has also sold well to amateur fishermen along the coast and those fishing the inland lakes and rivers. The manufacturers claim that this boat has a bigger water displacement than similar wooden boats, which provides excellent stability in spite of its lighter weight. This boat is easy to manoeuvre and is claimed to hold course excellently even in heavy winds. It is finished with a well flared bow designed to protect the occupants from splash, and as the hull is heavily reinforced the boat is particularly strong, reliable in difficult weather conditions.

Mr R. E. G. Windsor has been appointed deputy chairman of Webley and Scott.

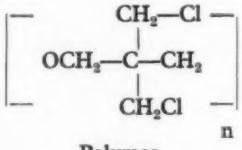
Plastics Materials and Processing

PARIS CONVENTION—2

A PAPER entitled 'Penton, a New Thermoplastic Polyether,' was delivered by M. R. W. Cairns, director of research, Hercules Powder Co., Wilmington, U.S., and V. R. Grassie. The monomer 3 bis chlormethyl oxitane was obtained from pentaarithritol and gave a polymer as follows:



Monomer



Polymer

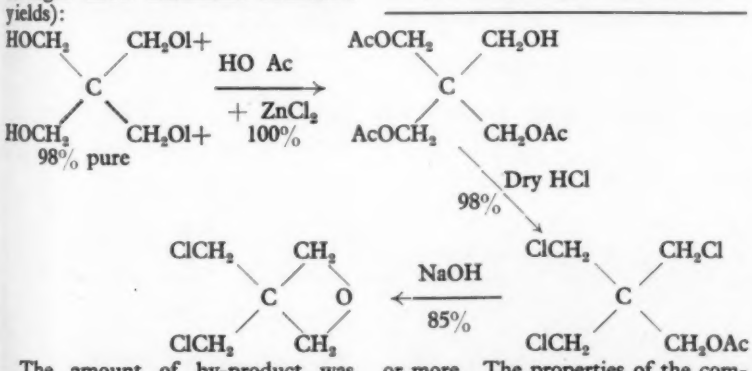
A number of oxitane polymers had already been known and the lecturer referred especially to the work of Campbell and of Farthing of I.C.I. Ltd. A few properties of the earlier polymers were as follows:

$$OCH_2—CRR'—CH_2—$$

Nature of:

R	R'	M.Pt.°C.	Nature
H	H	35	Crystalline
H	CH_3	—	Amorphous
CH_3	CH_3	47	Crystalline
CH_3	CH_2Cl	—	Rubbery
CH_3CH_2	CH_2Cl	100	Crystalline

The monomer synthesis took place in three stages which may be shown diagrammatically as follows (the percentages show maximum obtainable yields):



The amount of by-product was small. The tetrachlor compound was produced only with difficulty and the amount of dichlor was kept low. Fractional distillation, to give a pure monomer, was necessary in order to produce polymers of high molecular weight. The monomer had the following characteristics:

Boiling point	..	204°C.
Freezing point	..	19°C.
Density	.. ..	1.297

Pure monomer was polymerized by means of Lewis acid; details of the procedure had already been published by Farthing and Boardman.

At first a solution of boron trifluoride in methylene chloride was used at a temperature of –20 to 50°C., but the polymer was precipitated in lumps which were difficult to handle. Sulphur dichloride as solvent gave a better result but it was now possible to polymerize in bulk at 200°C. using an aluminium alkyl catalyst of which only a few hundred parts per million were needed. Heat of the reaction was removed by refluxing of monomer. Some 10 to 15% of residual monomer was removed by a vacuum distillation.

Properties of Penton

Measurement of the viscosity of a 1% solution in cyclohexanone was used to measure the molecular weight, which averaged 250,000 to 400,000. Melting point was 180°C. Penton was a hydrophylic slightly tan coloured material characterized by its solvent resistance and great chemical inertness. The chloromethyl groups were most difficult to remove and Penton did not break down at temperatures at which PVC was affected.

There were two allotropic forms: alpha which was formed when the quenching temperature was 110°C. or less, and beta which was formed when the quenching temperature was 120°C. or more. The properties of the commercial material depended upon the ratio of these two forms.

Although Penton was not as resistant to nitric acid its resistance otherwise was similar to that of the polyfluorohydrocarbons. It resisted ethylene dichloride in the cold but was affected by prolonged exposure to this solvent at elevated temperatures. Water absorption was less than that of either PVC or nylon.

Fabrication and dimensional stability

The material was very suitable for injection moulding at 425 to 465°F. It crystallized slowly so that precision moulding to close limits was possible. The polymer may be extruded in the amorphous condition and then crystallized.

Electrical properties

These lay between the high dielectrics such as polystyrene and the phenolics. Electrical properties were stable under humid conditions and did not change much after the material had been exposed to temperatures of 100 to 125°C.

Tensile properties

Heat distortion properties were superior to those of 'ordinary' thermoplastics. Elongation at break was 170 to 175% and the impact strength was comparable with that of the trifluorocarbons. Stretched films had a tensile strength up to 17,000 psi. Monofilaments drawn at 400% had a tensile of 20,000 psi and when drawn at 60%, 40,000 psi.

Uses

Penton was serviceable at temperatures up to about 250°C. It was useful for corrosion resistance. Coatings could be applied by spray or by whirl sintering. Precision moulded valves could be made from it and a diaphragm valve with a Penton body was demonstrated. The ease of fabrication was attractive and the machine and other moulded parts, gears, retaining rings and extrusions could be made. The oriented film showed promise for packing—it resisted sterilizing temperatures. Monofilaments could be used in ropes.

The present price was $6 per pound but the volume cost was comparable to that of Teflon or nickel.

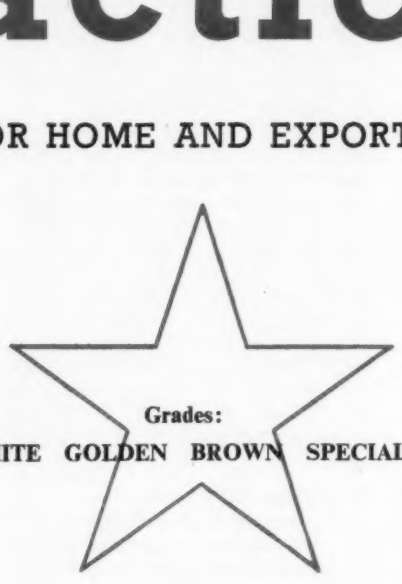
In reply to questions Dr Cairns said that the output would be several million lb. per year. Since it cost ten times as much as polypropylene, Penton would only be used where its outstanding chemical and temperature resistance was required.

He did not think that anyone would wish to plasticize the material and in any case this would be difficult because few substances were compatible with it.

*Specialities**

factice

FOR HOME AND EXPORT



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Rubber Materials

PAPERS AT THE PARIS CONVENTION

IN his paper on the 'Surface Chemistry and Reactivity of Carbon Black,' J. B. Donnet said that all carbon blacks contained oxygen to some degree. A number of interesting variants had been obtained by controlled oxidation of carbon blacks, *e.g.* with nitric acid, although other oxidizing agents had been used. Oxygen content could be increased to over 9%, and there was also an appreciable hydrogen content. Some studies had been made of the specific surface of carbon black, which dropped from an average of 345 to about 140A² during treatment.

Various Philblacks had been examined, but the effect of the oxidized carbon blacks did not seem to be very marked when compounded.

In general the surface oxidation of carbon black caused the formation of a number of groups such as ketones and acids. The kinetics of these reactions had been studied, and results obtained gave interesting indications of the surface properties of carbon black. The oxidation products threw new light on the structure of carbon black.

Carbon black under normal conditions, was believed to contain trapped 'radicals,' of the type postulated by Bamford and Dainton. The effect on the polymerization of styrene had been studied, and whilst under comparable conditions with normal polymerization the latter was inhibited for about 2½ hours in the presence of 2% of carbon black, subsequently the reaction rate was considerably increased. This applied whether oxidized carbon black (Philblack O) was used or untreated Philblack. The period of inhibition varied as the square root of the concentration of carbon black.

An interesting feature of the oxidized black was that it dispersed much more readily in water after oxidation.

Conversion of Rubber into Plastic-like Materials

M. C. Pinazzi, discussing the conversion of rubber into plastic-like materials, said that rubber could be modified by reaction with —SH groups or by reaction of the double bonds Diels-Alder Fashion with maleic anhydride. The reaction could be made to operate under mastication conditions (Snyder and Paxton).

About 4–6% of anhydride groups could be introduced into natural rubber. Some free radical producing reagents interfered with the reaction, and tended to cause a vinyl type addition rather than a Diels-Alder reaction. AZDN, in the absence of oxygen, however, promoted the Diels-Alder type addition. There was no reaction at 80°C., and the preferred temperatures are 230-250°C. Details were given on reaction conditions and mechanism, and up to 25% maleic anhydride could be introduced under favourable conditions. The final product could be vulcanized with PbO. A number of interesting modifications could be obtained by direct esterification of the anhydride groups. The maleic modified rubber could be reinforced with carbon black.

Production of Natural Rubber in Temperate Zones

J. L. Ramos, of Spain, in his paper on the 'Production of Natural Rubber in Temperate Zones,' said that Spain had little rubber in its metropolitan territories, and there were very considerable difficulties in producing rubber in the tropical region of Guinea. In consequence, efforts had been made to cultivate rubber in temperate zones, and guayule had been chosen for economic considerations, and the possibility of cultivating this rubber plant in the impoverished soil of Spain.

Experiments had proceeded for about 15 years. These had determined the limiting factors of culture, and suitable economic considerations. Details were given on the experimental and industrial plan for cultivating guayule, and processes for cultivating and harvesting, as well as laboratory and pilot plant procedures.

Physical and chemical properties of the rubbers obtained had been examined, and the author concluded that the production of rubber in a temperate zone was an economic possibility, and prices should be competitive.

Vulcanization of Rubber by X-Rays

Mlle G. Lamm, M. A. Lamm and M. H. Madelaine, in a paper on the 'Vulcanization of Rubber by X-Rays,' said that the influence of the amount of radiation on the principal mechanical properties of a mixture of rubber and furnace black had been studied. The amount of radiation necessary to give optimum properties in presence and absence of oxygen had been investigated, as well as the effect of various additives in producing graft copolymers. These included certain vinyl monomers such as methyl methacrylate and styrene. It was found that the purity of the styrene used had a profound effect on the rate of grafting. Quantitative aspects of the use of X-rays had been studied and equations derived.

Characteristics of Guayule Rubber

Discussing the 'Characteristics of Guayule Rubber,' E. D. Bernal said he had made a histological and histochemical study of its properties. Certain genetic methods of improvement had been utilized. The non-rubber materials in guayule rubber and the effects on vulcanization had been studied, but vulcanization was comparable to hevea rubber. Consideration had been given, not merely to offering pure guayule rubber commercially, but also to the entire rubber solids treated with maleic anhydride. This product was called Guma, and its properties were under examination.

Mr L. J. Bailey, general manager of the India Tyre and Rubber Co., has been appointed general manager of Dunlop's German subsidiary (Deutsche Dunlop Gummi Co., AG) in place of Mr E. F. Hingeley, who has retired.

Peerless Cars Ltd., Farnham Road, Slough, Bucks, have recently introduced their Series II Peerless GT 2-litre car; the Series I was announced in June last year. The body of the Series II, like that of its predecessor, is manufactured in fibre glass by the Wincanton Transport and Engineering Co., Woking.

Reviews

HEAT SEALING AND HIGH FREQUENCY WELDING OF PLASTICS—By Dr H. P. Zade. (Temple Press, London, 35s.)

Dr Zade is well known in the plastics industry and therefore anything that he writes is certainly worthy of serious examination. In this book, 'Heat Sealing and High Frequency Welding of Plastics,' it is quite apparent that the theory of welding and heat sealing has been very carefully examined with regard to a very wide range of thermoplastics, some of which are certainly not in use in the UK as yet.

Also the theoretical aspects of the different heat sealing and high frequency welding equipment have been examined with regard to the various practical applications for these processes.

The book will certainly be of considerable interest to those engaged in the packaging, plastic clothing and toy industries as the processes described are ideally suited to these fields.

However, to the engineer engaged in the fabrication of large plant and equipment such as ducting, fans, tanks, scrubbing units and other similar plant, there is not enough detailed practical information on the welding of thermoplastics or in the development of new welding processes and plant for this field especially with regard to PVC, polythene and HD polythene.

With these exceptions this book should be of real value to the production, planning and development departments of the packaging, containers, plastic clothing, toy and other related industries.

LAMINATED PLASTICS—By D. J. Duffin. (Reinbold Publishing Corporation, New York: Chapman and Hall, London. 46s.)

This publication is written more particularly for users and fabricators of laminated plastics than for manufacturers. It is of a semi-technical nature, valuable, therefore, in the main to the practical engineer, and can be regarded as a good basic individual reference to the subject.

The first chapters deal in simple form with the chemical and physical properties of the various types of resins available, followed by a useful chapter on the machining and working of laminates.

A considerable amount of interesting and, in some cases new, information is given on application, and end products, in particular the use of resins to make moulds. Many examples of products and applications in the US are illustrated, especially in the aircraft, electronics and small boats field with the names of the companies engaged in this work. Some space is also devoted to the subject of vinyl-coated steel pipe which in the US is apparently competitive with conventional galvanized conduit. Also the development of vinyl-coated steel for automobile interiors is dealt with. Included in this chapter are some useful tables giving applications of various resins and details of applications for laminated plastics in individual industries.

All in all the book should be of real interest to those engaged in the production side of laminated plastics and laminated plastics products; it may also be of some interest to companies who wish to make their own moulds within the plastics industry, perhaps particularly in the field of vacuum and press forming.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

Export Opportunities

PVC Foam Sheeting

Jones and Yandell Manufacturing Co. Inc., 112 E. Center Street, Canton, Missouri, USA, have informed the British Consulate-General at New Orleans, that they are interested in receiving quotations from UK manufacturers of the following:

Polyvinyl chloride foam in sheets, approximately 50in. x 84in. Sample 'A' in thicknesses of $\frac{1}{4}$in., $\frac{3}{8}$in. and $\frac{1}{2}$in. Sample 'B'—$\frac{1}{2}$in. thickness only.

Samples are available for inspection in Room 620 at this branch until September 7, after which they will be sent out on loan in order of receipt of applications. 'A' is used for protective padding of athletic uniforms and equipment. Sample 'B' is used for belts for water skiing. The firm will complete waterproofing of samples.

In quoting, prices should be based on various quantities up to 5,000 sheets of a size. Sheets must not be compressed and should preferably be packed in cartons containing 25 sheets, and protected for overseas shipment.

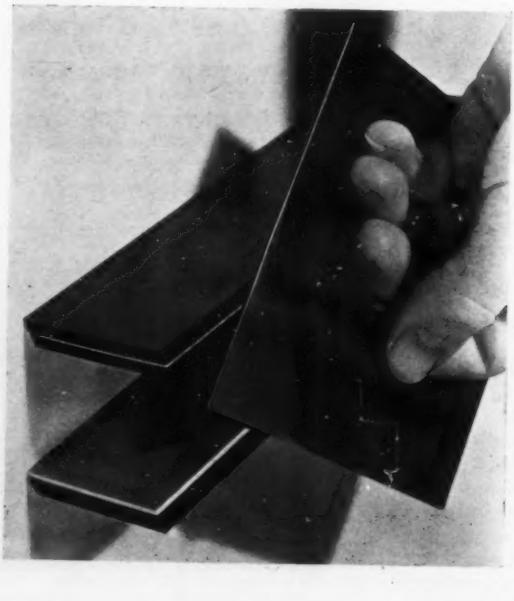
Manufacturers interested in this enquiry should write by air mail direct to Jones and Yandell Manufacturing Co. Inc., for the attention of Mr C. B. Kennedy, vice-president. It is important that quotations should show both fob and cif prices in US dollars: all packing included in prices. Firms should copy their initial correspondence to the British Consulate-General, 403 International Trade Mart, New Orleans 12, to enable the enquiry to be pursued and to assist in approaching other potential importers. Board of Trade reference ESB/20265/59.

The address of the Export Services Branch of the Board of Trade is Lacon House, Theobalds Road, London, W.C.1. Telephone number: Chancery 4411, extensions 776 or 866.

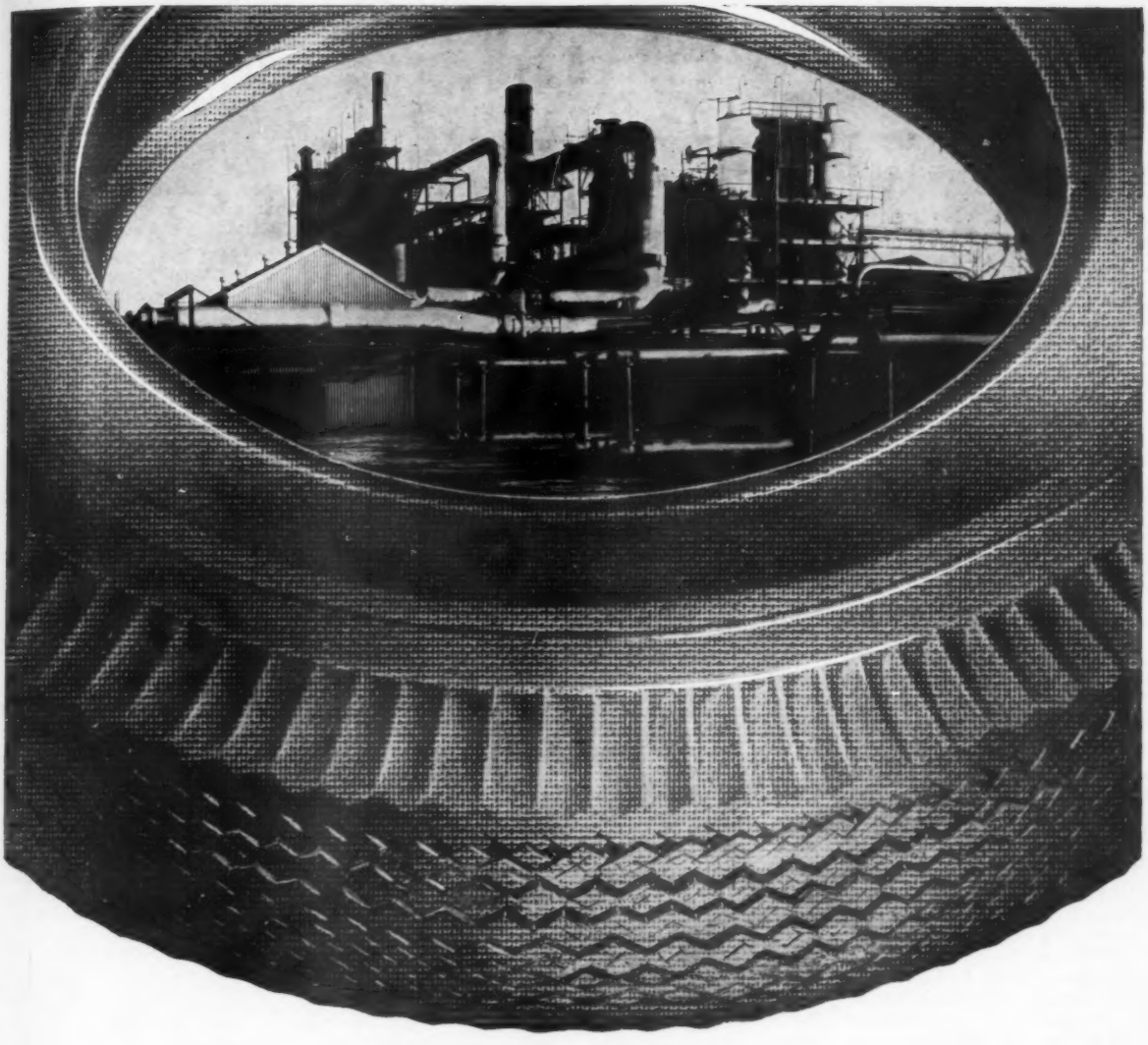
CIC Councillors

New Councillors of The Chemical Institute of Canada were announced at the Institute's 42nd Conference recently. Among the new Councillors 'A' representing the Institute's chemistry and chemical engineering members from coast to coast in Canada is Mr B. A. B. Clark, assistant to the vice-president, Harrisons and Crosfield (Canada) Ltd, Toronto, Ontario.

Mr K. J. Lewis has been appointed a director of the Gula-Kalumpong Rubber Estates.



A new type of sealing material — a laminate of light alloy sheet and Hycar synthetic rubber, intimately bonded together — has recently been put on the market. The main advantage of this laminate, sold in several thicknesses and sizes under the trade name of Hy-Clad, over conventional sealing materials is the fact that it combines the rigidity of metal with the oil resistance of Hycar, enabling gaskets and washers made from it to be used repeatedly without damage. Hy-Clad is made by Fireproof Tanks Ltd., Portsmouth, and Hycar is made by British Geon Ltd.



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Rubber Statistics

MALAYAN SHIPMENTS AND IMPORTS

DETAILS of Malaya's ocean shipments and imports for the month of July have now been issued by Malaya House. The following tables, which are expressed in long tons, summarize the information issued:

Ocean shipments to:	Sheet and crepe	Latex
UK	15,454	2,833
USA	12,039	2,620
South Africa	2,218	98
Canada	3,162	7
Australia	2,703	379
France	4,202	350
Western Germany	7,130	651
Italy	3,980	382
Netherlands	725	80
Poland	2,138	41
Spain	1,304	148
Sweden	1,412	61
USSR	15,100	—
Argentina	1,928	120
Brazil	1,471	—
Japan	12,620	1,477
Others	10,786	515
	98,372	9,762

Imports from:	Total
Indonesia: Sumatra	20,110
Borneo	12,485
Remainder	2,903
British Borneo	3,577
Thailand	2,001
Others	519
	41,595

At 108,134 tons, ocean shipments were at their highest level this year, exceeding the total for June by nearly 15,000 tons. Up to the end of July, shipments had totalled 683,925 tons, compared with shipments of 606,074 tons during the first seven months of last year. Comparing the two years, shipments to the UK had fallen from 125,657 tons to 91,278 tons, while those to the USA had risen from 64,785 tons to 96,655 tons. First place among Malaya's customers during these months was held by Russia, which took 107,768 tons against a mere 12,474 tons in the earlier period. Fourth came Japan with 72,507 tons against 60,064 tons, while fifth and sixth were Western Germany and France with respectively 44,990 tons and 41,144 tons compared with 44,194 tons and 33,950 tons. China, which in the earlier period took 43,433 tons, took only 6,000 tons.

The July imports brought the total for the first seven months of the year to 256,809 tons compared with a total for the first seven months of 1958 of 240,950 tons.

Stocks of rubber in Singapore at the end of June were almost unchanged compared with a month earlier at 44,276 tons. Of this total, 37,002 tons were held by dealers, 7,242 tons were in the port, and 32 tons were on estates. In addition, 1,640 tons were on transhipment to destinations outside Singapore.

US Tyre Statistics

The Rubber Manufacturers' Association of New York states that manufacturers' shipments of passenger car tyres during June, at almost 8.9m. units, exceeded those of the previous month by almost 4½%. Production of passenger car tyres during June was almost half as great again as the May figure, with over 9m. units, the ending of strikes at a number of major rubber plants accounting for this increase. Shipments of bus and truck tyres, at 1.35m. units, showed an increase of over 10%.

The figures for the first half of the year, compared with those for 1958, show that passenger tyre production totalled over 50m. compared with slightly more than 40m., while shipments totalled over 52m. compared with 42½m. Stocks were just above 16m. compared with 17½m. Production of bus and truck tyres totalled 7½m. and shipments 7½m. compared with just over 5.9m. in each case in 1958, stocks having fallen to just below 3m. compared with nearly 3½m.

Rubber Crop Returns

RUBBER ESTATE AGENCY LTD.

	June 1959 lb.		Fin. year to date lb.		No. of mths. of fin. year to date
Bandar Sumatra	83,500	(71,000)	1,072,500	(933,000)	11
Batu Kawan	64,900	(59,200)	612,500	(578,560)	10
Buntar	110,000	(90,000)	1,197,300	(1,055,800)	12
Eastern Sumatra	302,000	(310,000)	1,110,000	(1,048,000)	4
Amalgamated Rubber	35,200	(37,400)	202,400	(222,200)	6
Java Rubber Plantations	85,800	(92,180)	535,700	(559,020)	6
Jeram	342,500	(210,000)	911,000	(530,000)	3
Kepitigalla	52,000	(65,000)	128,000	(160,000)	3
Kuala Lumpur	633,450	(554,060)	5,514,380	(4,126,590)	12
Langkat Sumatra	73,000	(67,000)	426,000	(413,000)	6
Soember Ajoe	20,460	(31,900)	244,200	(269,500)	9
Sungei Bahru	113,000	(90,000)	310,000	(238,000)	3
Sungei Kahang	164,700	(134,900)	606,010	(541,800)	4
Tambira	106,780	(93,740)	1,257,910	(1,295,870)	12
Tamiang (Malaya)	69,000	(70,000)	652,000	(519,000)	9
Tanjong Malim	367,500	(264,240)	4,256,400	(3,451,840)	12

HARRISONS AND CROSFIELD

	June 1959 lb.		Fin. year to date lb.		No. of mths. of fin. year to date
Sumatra					
Allied Sumatra	725,313	(713,188)	4,173,087	(4,364,105)	6
Asahan	110,230	(101,411)	1,272,054	(1,371,261)	11
Bah Lias	136,686	(154,322)	1,170,643	(1,578,494)	8
Central Sumatra	67,242	(74,956)	1,011,912	(1,147,524)	12
Lankat Rubber	60,186	(55,556)	160,495	(162,479)	3
Mendaris	176,368	(191,800)	994,275	(1,066,594)	6
Namoe Tongan	264,552	(249,120)	2,321,444	(2,666,464)	10
Sialang	194,887	(169,754)	906,091	(835,984)	5
Soengei Rampah	55,115	(40,785)	285,496	(281,086)	6
Tanah Datar	71,649	(72,752)	386,907	(432,102)	6
Tandjong	136,686	(130,781)	1,747,084	(1,656,839)	12
Toerangie	180,777	(194,005)	1,499,128	(1,686,519)	8
United Lankat	25,573	(31,085)	158,180	(172,620)	6
United Serdang	751,768	(944,525)	8,477,348	(9,823,772)	10
Malaya and Borneo					
Castlefield	298,500	(206,500)	2,932,500	(2,504,500)	12
Golden Hope	750,000	(613,500)	2,721,300	(2,281,000)	4
Holyrood	72,000	(71,000)	405,500	(363,400)	6
Hongkong	28,200	(21,700)	159,100	(112,500)	6
Hoscote	242,400	(210,300)	2,882,500	(2,719,000)	12
Killinghall	46,000	(36,800)	521,500	(419,100)	12
Kuala Selangor	74,000	(53,000)	361,000	(278,000)	6
Kulai	199,000	(140,000)	1,606,000	(1,189,500)	8
Lanadron	440,000	(366,000)	2,358,600	(2,142,100)	6
London Asiatic	1,441,300	(1,370,400)	8,471,700	(7,625,800)	6
Malaysia	57,000	(56,000)	306,000	(334,000)	6
New Crocodile	238,500	(230,000)	875,000	(855,500)	4
Patalang	1,272,000	(992,000)	9,296,000	(7,488,500)	8
Prang Besar	261,800	(167,400)	734,800	(497,700)	3
Sandac	67,600	(62,500)	209,400	(191,500)	3
Sapong	155,000	(141,000)	846,000	(754,000)	6
Seaport	72,000	(82,000)	908,000	(928,000)	12
Strathisla	112,000	(103,000)	1,270,000	(1,065,000)	12
South India and Ceylon					
Malayalam	341,900	(396,800)	1,782,400	(1,818,700)	3
Lunuva	85,023	(88,656)	576,998	(634,150)	6
Java Companies					
Bajoe Kidoel	190,268	(197,693)	413,307	(380,034)	2
Djasinga	126,335	(117,521)	1,321,438	(1,320,016)	11

Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. Cif duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated.*

(c-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (min., 70,000-lb. lots)	(e-qdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.34
1007 " "	23.34
1009 " "	23.71
1011 " "	23.71
1012 " "	23.24
1013 " "	23.94
1500 Cold, Non-Oil	23.10
1501 " "	23.10
1502 " "	23.10
1703 Cold, Oil-Extended, 25% oil	*20.31
1705 " " " "	*20.07
1707 " " 37.5% oil	*18.89
1708 " " " "	*18.89
1710 " " " "	*18.66
1712 " " " "	*18.66

* Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (carloads lots of 30,000 lb.)	(cifUKdp*)
1000 Hot, Non-Oil	23.99
1001 " "	23.99
1004 " "	23.99
1006 " "	23.99
1009 " "	24.61
1018 " "	26.74
1019 " "	26.26
1500 Cold, Non-Oil	23.99
1502 " "	23.99
1503 " "	26.02
3110 " "	25.78
1703 Cold, Oil-Extended	20.69
1708 " "	19.27

* US/£ conversion rate $2.80

Cariflex (Shell Chemical Company)	(e-sUK)
S-1000 Hot	22.0
S-1002 "	23.375
S-1006 "	22.0
S-1009 "	24.0
S-1011 "	24.0
S-1013 "	24.0
S-1100 Hot/black	19.75
S-1500 Cold	22.0
S-1502 "	22.0
S-1600 Cold/black	19.625
S-1602 " "	19.625
S-1605 " "	19.375
S-1703 Cold, Oil-Extended	20.25
S-1707 " "	17.75
S-1709 " "	17.5
S-1712 " "	17.5
S-1803 Cold, Oil/Black Masterbatch	17.875

Copo (Copolymer)	(cifUKdp)
1006 Hot, Non-Oil	23.25
1500 Cold, "	23.25
1502 " "	23.25
1505 " "	26.00
1712 " Oil-Extended	18.50
1778 " "	18.75
3900 " Rosin-Extended	23.125

FR-S (Firestone)	(cifUKdp)*
1000 Hot	23.187
1001 "	23.187
1004 "	23.187
1006 "	23.187
1500 Cold	23.187
1502 "	23.187
146 "	23.187
1703 Oil-Extended	20.125
1712 "	18.5
123 "	19.187
155 "	18.5
173 "	20.125
178 "	18.75
1009 Specialty	24.625
1010 "	25.812
1012 "	24.187
1013 "	24.875
1014 "	27.75
1015 "	28.75
141 "	28.625
158 "	29.562

*US/£ conversion rate $2.80

International Synthetic Rubber Co.	(ex-wks)
Intol 1500	22
Intol 1502	22
Intol 1710	17.5
Intol 1712	17.5

Philprene (Phillips)	(c-qdp*)
1000 Hot, Non-Pigmented	23.28
1001 " "	23.28
1006 " "	23.28
1009 " "	24.69
1010 " "	25.86
1018 " "	26.80
1019 Hot, Non-Pigmented	26.33
1100 Hot, Pigmented	19.65
1104 " "	19.28
1500 Cold, Non-Pigmented	23.28
1502 " "	23.28
1503 " "	26.10
1601 Cold, Pigmented	19.56
1605 " "	19.28
1703 Cold, Oil-Extended	20.23
1706 " "	19.94
1708 " "	18.82
1712 " "	18.58
1803 " Pigmntd, Oil-Extended	17.78
1805 " " "	15.99

*US/£ conversion rate $2.81½

Plioflex (Goodyear)	(fasUSport US Cents per lb.)
1006 Hot, Non-Pigmented	23.25
1500 Cold, Non-Pigmented	23.25
1502 " "	23.25
1703 Cold, Oil-Extended	20.00
1710 " "	18.25
1712 " "	18.25
1713 " "	16.9
1714 " "	16.65
1773 Cold, Oil-Extended, Light-Coloured	20.00
1778 Cold, Oil-Extended, Light-Coloured	18.5

Polysar (Polymer UK)	(e-sUK)
Krylene NS Cold Non-Staining	22

Synpol (Texas-U.S. Chemical Company)	(cifUKdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.20
1007 " "	23.20
1009 " "	23.71
1012 " "	23.24
1061 " "	23.10
X-274	25.32
8000	23.94
1500 Cold, Non-Oil	23.10
1502 " "	23.10
1551 " "	23.10
1703 Cold, Oil-Extended	20.13
1707 " "	18.71
1708 " "	18.71
1711 " "	18.62
1712 " "	18.48
8200 " "	18.71
8201 " "	17.20
8150 Cold, Black Masterbatch	19.46
8253 Cold, Oil and Black Masterbatch	16.20
8254 Cold, Oil and Black Masterbatch	15.83
8256 Cold, Oil and Black Masterbatch	16.33

US/£ conversion rate $2.80

SBR LATICES

Copo (Copolymer) (10-ton lots)	(cifUKdp)
2101 (dry weight)	46.30
X-765 (" ")	40.80
X-800 (" ")	37.20
2102 (" ")	38.00
2105 (" ")	38.00
2110 (" ")	38.00

Naugatex (Naugatuck Chemical International)	(ex-wUK)
2000	39
2001	39
2002	39.5
2006	43
2105	40
2107	40
2108	40
2711	39
2714	39
2733	39
2740	43

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex	
2001 (dry weight)	40
2104 " "	40
2105 " "	40
2108 " "	40
5350 " "	40

Pliolite Resin (Goodyear)	(d)
101A (dry weight)	44
150 (" ")	50
151 (" ")	35
160 (" ")	50
170 (" ")	50

Hycar (B. F. Goodrich)	(ddp)
2507 (high styrene) dry weight	48

Polysar (Polymer UK)	(e-sUK)
Latex, type IV	32.5
Latex, type 721	31.75

International Synthetic Rubber Co.	(ex-wks)
Intol Latex R23	22
Intol Latex M23	22

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G	45
N—7	45
N—8	45
N600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 " " Cold	52
1002 Medium High Nitrile Hot	45
1042 " " " Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 High Nitrile (powder)	66
1432 Medium High Nitrile (crumb)	64
1072 Medium High Nitrile (carboxyl)	66
1312 Medium High Nitrile (liquid)	55
1043 Medium Low Nitrile	51
1014 Low Nitrile	61
I.C.I. (min. 5-cwt. lots)	(UKd)
Butakon A-4051 High Nitrile Cold	52
Butakon A-3051 Medium Nitrile High Mooney Cold	45
Butakon A-3002 Medium Nitrile Low Mooney Cold	45
Paracril (US Rubber)	(e-sUK)
18-80 Low Nitrile	63
AJ " "	50
B Medium Low Nitrile	51
BJ " " "	51
BLT " " " Cold	51
BJLT " " " "	51
C Medium High Nitrile	59
CLT " " " Cold	59
CV " " "(crumb)	60
D High Nitrile	67
ALT	51
Polysar (Polymer UK)	(d)
Krynac 800 Medium Nitrile	45
Krynac 802 Low "	45
Krynac 803 Medium " (low Mooney)	45
Krynac 801 High Nitrile	52

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dry weight)	53
N-400 (" ")	60.5
Chemigum Latex (Goodyear)	(d)
200 (dry weight)	65
235 CHS (" ")	60
236 (" ")	60
245 B (" ")	52
245 CHS (" ")	52
246 (" ")	52
247 (" ")	52
248 (" ")	52
Hycar (B. F. Goodrich) (dry weight, 3 drums and over)	(ddp)
1551 High Nitrile (large particle)	66
1552 Medium High Nitrile (large particle)	57
Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 " " (carboxyl)	60
1562 Medium High Nitrile	52
1577 " " " (modified)	

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso	(e-sUK)
Regular 035	21.75
Regular 150	21.75
Regular 215	21.75
Regular 217	21.75
Regular 218	21.75
Regular 325	21.75
Non-staining 065	22.75
Non-staining 165	22.75
Non-staining 265	22.75
Non-staining 267	22.75
Non-staining 268	22.75
Non-staining 365	22.75
Vistanex (Polyisobutylene)	(e-qdp)
MS Low molecular weight	54
MH " " "	54
L-80 Medium molecular weight	54
L-100 " " "	54
L-120 " " "	54
L-140 " " "	54
Polysar (Polymer UK)	(e-sUK)
Butyl 100	21.75
Butyl 200	21.75
Butyl 300	21.75
Butyl 301 (non-staining)	21.75
Butyl 400	21.75
Butyl 101 (non-staining)	26.25
Butyl 402	22.5
Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

NEOPRENES

	(e-qdp)
W and WHV (dry weight del)	42.62
WRT (" " ")	48.37
WX (" " ")	44.62
GN (" " ")	44.62
GNA (" " ")	44.62
GRT and S (" " ")	45.62
AC (" " ")	57.125
KNR (" " ")	75.62
AC'M'and'S' (" " ")	57.125
CG (" " ")	57.125
AD (" " ")	57.125
Latices—Dry (per lb. del, min. 50 lb.)	
571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILASTOMER

Midland Silicones (500 lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23s. 6d.

REINFORCING RESINS AND RUBBERS

I.C.I. (min. 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5
Hycar (B. F. Goodrich)	(ddp)
2007 (powder)	42.5
Pliolite (Goodyear)	(d)
S—6B	36.5
Polysar (Polymer UK)	(e-sUK)
SS-250 (high styrene) (bale form)	27.25
SS-250 (" ") (flake form)	27.5
Kryflex 252 (high styrene)	25.5
Cyclite (Durham Raw Materials)	42

HYPALON

In 50-lb. bags del UK	71.62

Dexion Plastics

The plastics department of Dexion, makers of Undulite reinforced plastic sheeting have moved from Waltham Abbey to the company's new factory at Hemel Hempstead, Herts. The new address of the plastics department will be Maylands Avenue, Hemel Hempstead, Herts.

The telephone number of Wallington Weston and Co. Ltd., Frome, Somerset, has been altered to: Frome 3271 (seven lines).

Patent Specifications

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Preservation of Latex

No. 811,942. The British Rubber Producers' Research Association. Communication from D. H. Taysum, of the Rubber Research Institute of Malaya. Application, December 16 1955. Filed, December 17 1956. Published, April 15 1959.

Sulphonamides are claimed as preservatives for Hevea latex, the following sulphonamides being specifically mentioned as examples: sulphanilamide, sulphapyridine, sulphathiazole, sulphadiazine, sulphaguanidine, sulphamerizine, succinylsulphathiazole and phthalylsulphathiazole. The sulphonamides act as bactericides and either a single sulphonamide or a mixture of sulphonamides may be added to the latex, the minimum effective quantity of sulphonamide or mixture of sulphonamides being 0.001% by weight in the latex. The latex to which the sulphonamide is added may contain ammonia. It is stated in the Specification that the use of sulphonamides for latex preservation is believed to represent a significant step forward in controlling the quality of latex and latex concentrate.

Shorter Abstracts

Polymers. 810,228. Badische Anilin-und Soda-Fabrik AG. Filed, July 11 1956.—Ethylene or other olefinically unsaturated hydrocarbons are polymerized with the aid of a mixture of amyl sodium and a compound of a metal of Groups 4A, 5A or 6A of the Periodic System.

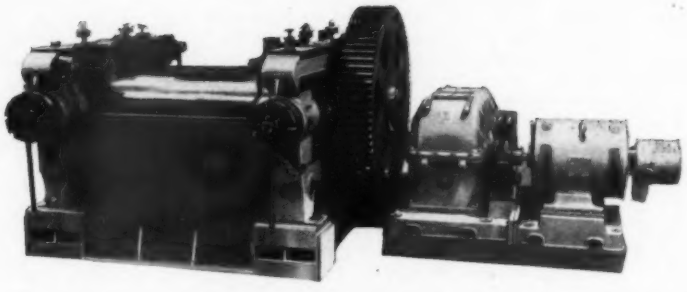
Copolymers. 810,515. Air Reduction Co. Inc. Filed, September 7 1956.—The invention is for copolymers of 2,2,2-trifluoroethyl vinyl ether and vinyl chloride or other chloro-olefin.

Antiozonants. 810,529. Universal Oil Products Co. Filed, December 28 1956.—2,6-Dialkoxy-4-alkylphenols are claimed as antiozonants for natural and synthetic rubber. Examples are 2, 6 - dimethoxy - 4 - methylphenol, 2, 6 - dimethoxy - 4 - ethylphenol and 2,6-dimethoxy-4-propylphenol.

Railway Vehicles. 810,734. George Spencer Moulton and Co. Ltd. Filed, February 14 1957.—A vestibule connection for railway corridor coaches is resiliently mounted on rubber torsional sheer spring suspension units which hold the vestibule diaphragms or bellows and the adjoining face plates in their articulated positions.

Mr I. C. M. Rush, Polymer Corporation Ltd., is among the 29 chemists and chemical engineers who have been elected as Fellows of The Chemical Institute of Canada.

Latex Engineering Co



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London Office: St. Dunstan's House, Idol Lane, London E.C.3. Telephone Mansion House 1005.

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

ONCE again the stock market has completely ignored the threat of the coming election. The past two weeks has witnessed buying of all top class shares and the plastics and rubber manufacturing groups have claimed more than a fair share of the available gains.

Most of the movements in our list of share prices have been the direct result of company news. It is now apparent that there has been a remarkable recovery in the chemical industry and that the pure plastics groups are experiencing boom conditions despite the talk of heavy competition.

ALBRIGHT AND WILSON ordinary shares shot up to 29s. 10½d. following the preliminary statement. This is their highest level yet, and compared with many other leading equities the price appears to be fully justified.

The interim dividend is lifted from 4% to 6% and there is to be a share bonus in ratio of one new share for every four already held. The directors add that no inference as to the final dividend should be drawn from either move. The increased interim they say is merely a move to reduce the existing disparity with the final payment and the scrip issue is to bring the issued capital more into line with the assets employed.

In the six months to June last the net profit was £1,122,000 which went against £793,000 in the corresponding period of 1958. For the whole of last year the total profit was £1,787,000. Despite the warning, the City has interpreted the profit figures as a 'bull' pointer and current buyers are obviously going for a rather substantial lift in the total dividend.

This hope may not turn out to be fully justified, certainly there is the definite possibility of a rise in dividend but these hopes should be weighed very carefully with the full preliminary statement which pointed out that present indications were that profits for the remainder of the current year may be slightly lower than those reported for the first half.

It was half-time for the MONSANTO CHEMICALS group, too. Its net profits for the first half of this year were up from £247,000 in the first half of 1958 to £371,000: this was struck after taxation of £348,000 against £284,000 last time.

A maintained interim of 5% was declared on the ordinary. Last year the total payment was 13½%. Once again the increased profits have given rise to hopes of an increased final dividend and as there is no sign of the present level of profitability declining there seems a very real basis for these hopes.

Monsanto ordinary shares are now up to 19s. 6d. which is a peak price, and show a yield of around 3½%. As the dividend is only 1½ times covered by last year's earnings it is obvious that the directors will have to be presented with really high profits for the full year before they are even able to consider lifting the dividend.

Prior to the full results the ordinary shares of the LEYLAND AND BIRMINGHAM RUBBER concern were lifted to 58s. 9d.—a new high point for the year. After news of a maintained di-

Continued on page 149

Share Price Movements

Par Value	Company	1958-59 High	Low	Aug. 22	Latest
5/-	Albright & W. Ord. ..	29/10½	13/4½	25/4½	29/9
£1	" " " 5% Pref...	16/7½	15/4½	16/3	16/3
5/-	Anchor Chemical Ord...	14/4½	10/3	14/3*	14/4½
5/-	Andersons Rub. Ord. ..	4/3¾	3/-	3/2½	3/2½
2/-	Anglo-Amer. Vulc. Fibre Ord.	4/3	2/-	3/6	3/7½
£1	Angus Geo. Ord. ..	29/10½	21/-	27/10½	28/3
5/-	Armitage (Sir Elk.) Ord.	4/10½	2/3	4/6¾	4/6¾
5/-	Ault & Wiborg Ord. ..	23/-	11/9	21/9	21/9
£1	Avon India Rubber Ord.	42/6	27/-	40/6	40/-
£1	" " " 6% Pref.	18/6	17/3	17/9	17/9
10/-	Bakelite Ord.	30/9	17/-	30/6	30/7½
£1	" 6% Pref. ..	19/6	18/3	18/3	18/3
£1	Baker Perkins Ord. ..	47/9	30/7½	43/9	44/3
4/-	Bank Bdg. Rubber Ord.	2/8½	1/6	2/6	2/8½
5/-	Boake (A.) Roberts Ord.	18/6	9/-	14/9	16/4½
£1	" " " 5% Pref.	15/1½	13/9	13/9	13/9
4/-	Brammer H. Ord. ..	14/9	9/6	14/3†	14/8¼
5/-	Bridge, David Ord. ..	32/-	16/3	32/-	32/-
5/-	Bright, John Ord. ..	13/10½	8/9	13/-	13/6
2/-	Brit. Ind. Plas. Ord. ..	8/6	4/9	7/4½	8/4½
2/-	" 10% (tax free) Pref.	5/9	4/7½	4/7½	4/7½
£1	British Xylonite Ord. ..	61/3	28/6	58/-	61/-
£1	" " 5% Pref.	15/9	14/-	15/9	15/9
5/-	BTR Ind. Ord.	13/3	9/4½	9/-	8/11¼
£1	" " 7½% Pref. ..	22/9	20/9	22/9	22/9
£1	Courtaulds Ord... ..	41/9	20/-	40/4½	41/4½
£1	" 5% 1st Pref.	18/6¾	15/7½	17/6	17/6
£1	" 6% 2nd Pref.	20/3	17/1½	20/3	20/3
4/-	Cow, P. B. Ord. ..	7/3	3/6	6/8½	7/2¼
£1	" 5% Pref. ..	14/3	10/9	14/1½	14/3
5/-	Dale, John Ord... ..	16/6	10/-	14/-	13/6
£1	" " 6% Pref. ..	16/-	13/-	15/11½	15/10½
1/-	Dannimac Mfg. Ord. ..	8/9	2/6	8/6	8/7½
10/-	De La Rue Ord. ..	54/-	42/9	49/-§	50/6
£1	" " " 3½% Pref. ..	11/9	10/-	10/9	10/9
6/8	Distillers Co. Ord. ..	28/9	15/9	27/6	28/6
£1	" " 6% Pref...	21/7½	19/10½	21/4½	21/6
£100	" 5% Conv. Loan	£96½	£91	£94½	£94½
£100	" 5¼% Unsec. Loan	£95	£87 7/8	£94½	£93¾
10/-	Dunlop Rubber Ord. ..	25/6	14/9	‡24/10½	25/4½
£1	" 5½% Pref.	19/-	15/10	18/10½	18/6
£100	" 3½% 1st Debs.	£75½	£67¾	£75	£75½
£100	" 4½% 2nd Debs.	£84	£78	£84	£84½
4/-	Ebonite Cont. Ord. ..	15/3	7/6	11/3	12/-
£1	English China Clays Ord.	66/-	29/9	63/9	65/9

Par Value	Company	1958-59 High	Low	Aug. 22	Latest
£1	Goodyear Tyre 4% Pref.	12/9	12/-	12/3	12/6
5/-	Greeff Chem. Ord. ..	25/3	14/-	22/3	25/-
10/-	" " 5½% Pref. ..	8/1½	7/9	8/-	8/1½
4/-	Greengate & Irwell Ord.	7/0¾	4/4½	4/6	4/9
£1	Harrisons & Crosfield Dd.	64/3	43/9	60/-	64/-
1/-	Hunt & Moscrop Ord. ..	1/8¼	1/1½	1/7½	1/8½
£1	Imp. Chem. Ord. ..	42/9	28/3	40/-	42/6
£1	" " 5% Pref. ..	17/9	16/-	17/9	17/6
£100	" 4½% Unsec. Loan	£88½	£80	£84¾*	£88½
£100	" 5½% Conv. Loan	£132	£99	£124½	£131
1/-	Kleemann (O. & M.) Ord.	6/-	2/6	5/9	5/10½
£1	" " 6½% Pref.	16/9	15/-	16/6	16/9
2/-	Lacrinoid Prod. Ord. ..	2/5¼	1/5¾	2/5¼	2/3¾
5/-	Laporte Ind. Ord. ..	27/6	13/7½	22/6	23/9
£1	" " 7½% Pref.	22/10½	21/10½	22/6	22/6
£1	Leyland & Birm. Rubber Ord.	58/9	39/9	55/-	56/-
£1	" " 6% Pref.	21/3	16/1½	17/-	17/-
2/-	London Rubber ..	11/1½	6/3	10/-‡	11/-‡
£1	" 6% Red. Cum. Pref.	19/9	16/3	18/9	18/9
£1	McKechnie Bros. Ord.	45/-	23/6	41/3	43/-
£1	" " 'A' Ord.	44/6	30/-	38/9	42/-
£1	" " 6% Cum. Pref.	17/-	16/-	16/9	16/6
5/-	Monsanto Chem. Ord. ..	19/6	13/-	17/9	19/6
£1	" " 3¾% Pref.	13/-	11/-	13/-	13/-
£100	" 6% Debs.	£104	£101¼	£103¼	£103½
£1	North British Rubber ..	—	—	16/-	16/-
5/-	Redfern Holdings Ord...	5/2½	2/10½	4/10½	4/7½
2/-	RFD Ltd. Ord.	6/6	3/5½	5/3¾	5/6¾
£1	" " 5½% Pref. ..	14/9	11/6	14/6	14/9
2/-	Rubber Imp. Ord. ..	15/6	4/9	5/1½	5/10½
2/-	" " 'A' Ord.	14/3	4/6	4/3	5/0¾
£1	" 5% 1st Pref.	12/3	10/-	10/-	10/-
5/-	Rubber Reg. Ord. ..	13/-	10/6	12/3	12/9¾
4/-	Shaw Francis Ord. ..	16/4½	9/9	15/7½†	16/4½
2/-	Silentbloc Ord. ..	10/2½	7/6	10/2½	10/2½
2/-	Sussex Rubber Ord. ..	1/11½	7½	1/11½	1/10½
5/-	Sutcliffe Speak Ord. ..	8/10½	5/-	8/9¾	8/-
£1	Turner & Newall Ord. ..	77/6	52/-	75/4½	77/1½
£1	" " 7% Pref.	25/-	22/1½	24/10½	25/-
5/-	Universal Asbestos Ord.	26/10½	8/0¾	23/9¾	26/9
5/-	Viscose Dev. Ord. ..	13/9	6/3	11/9	11/6
5/-	Warne William (Holdgs.) (Ord.	14/-	8/-	13/6	13/10½

*Ex-dividend †Ex-all ‡Ex-bonus §Ex-rights

Rubber Markets

LONDON

In contrast with its recent performance, nearby positions in the London rubber market record small losses on the week but the distant positions are better. The Spot, for example, is nearly a farthing easier at 31$\frac{11}{16}$d. per lb. and comparable losses are recorded in other nearby positions, but distant positions are up to three farthings higher. The recovery in the distant positions followed the news that the projected sales from the US stockpile are not likely to be large enough to have any material effect on the market situation.

Latest prices are as follows:

No. 1 RSS Spot: 31$\frac{5}{8}$d.-31$\frac{3}{4}$d.

Settlement House:

October 31$\frac{5}{8}$d.-31$\frac{3}{4}$d.

October/December 31d.-31$\frac{1}{8}$d.

January/March 30$\frac{1}{8}$d.-30$\frac{1}{4}$d.

April/June 29$\frac{1}{2}$d.-29$\frac{5}{8}$d.

July/September 29d.-29$\frac{1}{4}$d.

October/September 28$\frac{1}{2}$d.-28$\frac{3}{4}$d.

No. 1 RSS cif basis ports:

September 31d.-31$\frac{1}{4}$d.

October 30$\frac{3}{4}$d.-31d.

Godown:

September 107 Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, October shipment, 18s. 7d. seller, cif European ports. Spot, seller, 19s. 1d. Bulk, 18s. 6d. nominal value. Creamed, seller, 18s. 2d. Normal, seller, 14s. 4d.

AMSTERDAM

The Amsterdam rubber market ruled as follows on August 31:

No. 1 RMA	Guilders per kilo Aug. 31	Previous
August	Deleted	3.05
September	3.05	3.03
October	3.03	3.02
November	3.02	3.01
December	3.01	3.01$\frac{1}{2}$
October/December	3.01$\frac{1}{2}$	2.89$\frac{1}{2}$

Sales: Nil Tendency: Quiet

CEYLON

No. 1 RSS

The price for No. 1 RSS, spot, at Colombo on August 31 was 136$\frac{3}{4}$ (135$\frac{1}{2}$) Ceylon cents per lb.

SINGAPORE

The market opened unchanged on August 31, and ruled very quiet and featureless with minor fluctuations. Lower sheet interest was small and selective. Factories showed no interest. Only a small amount of business passed in a very quiet afternoon. After a small advance sellers came out and the market declined to just about noon levels for the close. During unofficial trading hours prices recovered to the highest levels of the day. Some inquiry for lower sheets found sellers reserved. The market finished on a quietly steady note.

Straits cents per lb., fob Malayan ports to open ports	Close	Previous Close
No. 1 RSS, Sept.	106$\frac{1}{2}$—106$\frac{7}{8}$	105$\frac{1}{2}$—106
Oct.	104$\frac{1}{4}$—105$\frac{1}{2}$	104 —104$\frac{1}{2}$
No. 2 RSS, Sept.	106 —106$\frac{1}{2}$	104$\frac{7}{8}$—105$\frac{3}{8}$
No. 3 RSS, Sept.	104$\frac{1}{2}$—105$\frac{1}{4}$	103$\frac{7}{8}$—104$\frac{1}{2}$
No. 4 RSS, Sept.	103$\frac{1}{2}$—104	102$\frac{1}{2}$—103$\frac{1}{4}$
No. 5 RSS, Sept.	100$\frac{3}{4}$—101$\frac{1}{2}$	100 —101
No. 1 RSS, Spot	107 —107$\frac{1}{2}$	106$\frac{1}{2}$—106$\frac{5}{8}$
No. 3 blanket thick remilled, Sept. ..	102 —104	101$\frac{1}{2}$—103$\frac{1}{2}$
Int. No. 1 fine pale crepe, Sept. ..	115 —117	114$\frac{1}{2}$—116$\frac{1}{2}$
2X thin brown crepe, Sept. ..	101 —102	100$\frac{1}{2}$—101$\frac{1}{2}$

Tendency: Quietly steady

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 207.20d. per gallon.

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on August 31 was 34.50 (34.50) US cents per lb.

NEW YORK

The following landed prices ruled in New York on August 31:

DEALERS' PRICES

Ex dock, U.S. cents per lb.	Aug. 31	Previous
No. 1 RSS, Sept.	37$\frac{1}{8}$b–38a	38n
Oct.	37$\frac{1}{8}$n	37$\frac{3}{8}$b–37$\frac{5}{8}$a
No. 2 RSS, Sept.	37$\frac{1}{8}$b–37$\frac{1}{4}$a	37$\frac{1}{4}$n
Oct.	37$\frac{1}{4}$n	37$\frac{1}{8}$b–37$\frac{3}{8}$a
No. 3 RSS, Sept.	37$\frac{1}{8}$b–37$\frac{1}{4}$a	37$\frac{1}{4}$n
Oct.	37n	36$\frac{7}{8}$b–37$\frac{1}{8}$a
No. 1 RSS, Spot	38$\frac{1}{4}$n	38$\frac{1}{4}$n
No. 3 amber blanket crepe, Nov.	36$\frac{1}{2}$b–36$\frac{3}{4}$a	36$\frac{1}{2}$b–36$\frac{3}{4}$a
No. 1 latex, thin crepe, Sept.	37$\frac{1}{4}$n	38$\frac{1}{8}$n
No. 1 latex, thick crepe, Sept. ..	38$\frac{1}{4}$a	38$\frac{7}{8}$n

FUTURES—REX CONTRACT

US cents per lb.	Close	Prev. Close
Sept. ..	36.80b	37.25b–38.00a
Nov. ..	36.55b–36.65a	37.05t
Jan. ..	35.35b–35.50a	35.80 –35.75t
March ..	34.60t	35.00b–35.20a
May ..	34.20 –34.25t	34.50b–34.65a
July ..	33.85b–34.10a	34.30b–34.40a
Sept. ..	33.65b–33.90a	34.10b–34.25a

Sales: 62 Tendency: Easy

Rubber futures were easier on scattered liquidation in a thin trading volume on August 31. Traders said selling here may be influenced by fears of a strike at the Goodyear Company after midnight. If a rubber strike develops factory consumption of natural rubber will drop sharply. Physical rubber was also easy when the futures market declined. Business in physical rubber was light.

DJAKARTA

The rubber market was closed on August 31 but previous prices were as follows:

Rupiahs per kilo	Previous
Spot No. 1 Priok.. ..	34.60b
Spot No. 2 Priok.. ..	33.80b
Spot No. 3 Priok.. ..	33.00b
No. 1 fine pale crepe, spot	31.75b

Tendency: Quiet

STOCK MARKET

Continued from page 148

tribution of 15% which is the equivalent of the 25% total paid last year, the shares dipped to 56s. 6d.

It is more likely, however, that the real reason for the fall was the profits, which were a little disappointing. Group profits declined from £820,000 to £748,000, and the net figure fell from £524,000 to £492,000.

The sharp rise in GREEFF CHEMICALS ordinary shares was due to very optimistic Press statements on the potential of the company's interest in the BRITISH TITAN PRODUCTS concern. The company's trade investments, which includes the interest in British Titan, have now been revalued on a dividend yield basis. The new valuation is £1,356,000 which is £480,000 in excess of the previous book value.

Greeff ordinary shares are now up to 25s. 3d. which compares with their 1958/59 low point of 14s.

Elsewhere in our share list the ordinary shares of the RUBBER IMPROVEMENT concern came to life again with a 9d. rise to 5s. 10$\frac{1}{2}$d. There is talk of better business ahead, but the shares are still rated as a speculation by market men. News of the improved trading conditions brought in buyers for both DISTILLERS and I.C.I. while BRITISH XYLONITE were again prominent.

Peradin and Watercraft Ltd.

With effect from September 1, the name of Peradin and Watercraft Ltd., general rubber manufacturers, of Bath, has been changed to Peradin Rubber Co. Ltd. The change of name is, the company states, only for convenience and does not imply any alteration in their present policy or lines of manufacture.

Mr G. C. Ives has joined the board of Yarsley Testing Laboratories as from May 1, in the capacity of technical director.

Industry INTELLIGENCE

Technical Data

Solvents, Plasticizers and Resinates

A number of solvents, plasticizers and resinates manufactured by S. A. Sheby, of Paris, are now being marketed in the UK by Charles H. Windschuegl Ltd., 1 Leadenhall Street, London, E.C.3. Usage of the materials is mainly in paints, varnishes, inks and lacquers, some being applicable to such products containing plastics. Included in the materials is 'Mouillant 54,' a wetting agent for the milling of pigments to be incorporated in paints. For certain pigments, a reduction of 40% in ball-milling time can be obtained by the use of 'Mouillant 54,' and the material is compatible with all media including cellulose and synthetic types. 'Teryl' is a solvent which finds use in nitrocellulose varnishes while 'Plastifiant 49' is a liquid plasticizer particularly suitable for nitrocellulose lacquers. 'Bergol' (methyl abietate) may be used as a solvent and plasticizer for vinyl chloride-vinyl acetate copolymers. It is also a solvent for chlorinated rubber. By dehydrogenating and isomerizing 'Bergol,' a material termed 'Berghydrol' is obtained, and this has a greater plasticizing effect than the original material. Data sheets on these materials are available from Charles H. Windschuegl Ltd.

Synpol SB Rubbers

The Synpol range of SB rubbers and black masterbatches has recently been extended to 25 types by the addition of six new types, brief particulars of which follow. Synpol 8000.—A high-styrene, non-staining, non-discolouring hot polymer designed for applications requiring high green strength and good flow. Synpol 8200.—A cold polymer extended with an extremely light-coloured naphthenic oil and suitable for applications where low moisture-absorption is required and for bright and light-coloured compounds. Synpol 8201.—Similar to 8200 but with a higher oil content. Synpol 8253.—Non-staining oil-black masterbatch containing a naphthenic oil and 60 phr of ultra-dispersed FEF black. Suitable for tyre sidewalls and carcasses and mechanical goods. Synpol 8254.—Staining oil-black masterbatch containing a highly-aromatic oil and 75 phr of ultra-dispersed HAF black. Suitable for tyres, soles and heels, moulded mechanical and sporting goods, wire and cable insulation and roller coatings. Synpol 8266.—Staining oil-black masterbatch containing a highly-aromatic oil and 75 phr of ultra-dispersed ISAF black. Specially suitable for tyre treads.

Chemical specifications, physical properties and other information on these six new Synpol types are given in a data sheet issued by the Texas-US Chemical Co., 260 Madison Avenue, New York 16, N.Y., USA.

Genthane-S

Genthane-S is a polyurethane elastomer having outstanding resistance to abrasion, good performance at low temperatures, excellent resistance to hydrocarbons, ozone and oxygen and remarkable stability at temperatures up to 300°F. A typical compound comprises Genthane-S 100, stearic acid 0.2, Statex M (FEF black) 25 and dicumyl peroxide 1.6. Examples of products for which Genthane-S shows advantages over other elastomers are aircraft components, solid tyres, storage tanks and hose for oil, heels, chute linings and surface coatings. The characteristics and applications of Genthane-S are summarised in News Bulletin No. 58 while full technical details are given in a booklet, both issued by the distributors of the material, Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4.

Machines, Materials and Equipment

TCS Storage Floor

TCS storage floors, fitted over rolled steel or tubular joists supported on tubular steel stanchions, forming a strong and rigid construction, have

been introduced by Tubular Construction Systems Ltd., 135 Battersea High Street, London, S.W.1, to solve the problem of using warehouse and storage space to the best advantage. The floors will carry loads of up to 300lb. per square ft. and, being entirely independent of the building, they can be constructed to any desired area, the height of the floor depending on the space available overhead.

PVC Stabilizers

The range of PVC stabilizers manufactured in Britain by Durham Chemicals Ltd. has been extended by the addition of Nuostabes, hitherto manufactured and marketed in the USA by the Durham Group's American associates, Nuodex Products Co. Distribution in the UK of all the Durham Group's products is undertaken by Durham Raw Materials Ltd., 1-4 Great Tower Street, London, E.C.3.

Nuostabes are PVC stabilizers in liquid form. They therefore conveniently complement the following existing Durham products: Durostabe Powders, a series of dry powdered metal soaps and salts, and Durostabe Pastes, which are Durostabe powders prepasted in plasticizer.

Comprehensive technical service is now immediately available and at Durham's Works at Birtley, Co. Durham, a pilot plant is equipped for the preparation of experimental materials.

Publications Received

Nylon Belting

Precision belting for high speed drives—operating efficiently at velocities up to 10,000ft. per minute—now being manufactured by R. and J. Dick Ltd., Greenhead Works, Glasgow, S.E., is described in a new catalogue issued by the company.

The belting, which is extremely thin and flexible, has a centre load carrying band of pre-stretched nylon bonded to outer layers of fabric woven from synthetic fibres. The driving surface of the belt is faced with synthetic rubber. The catalogue describes Dixylon transmission belting properties as stretchless, silent, smooth running, with a coefficient of friction equivalent to that of leather. In the standard quality, the belting is resistant to a certain degree to oils, spirits and greases. Maximum resistance to heat for continuous operation is about 210°F. A development is Dixylon Suplex belting, oil resisting and retaining its coefficient of friction even when operating where large quantities of running oil are present.

Adhesive and Binder Resins

A new data book describing their range of Cellobond adhesive and binder resins has been recently published by British Resin Products Ltd.

The data book provides basic technical information in a clear and concise manner. It is divided into eight sections, each dealing with a separate group of materials on the Cellobond range. These are as follows: Adhesive resins, laminating resins, polyester resins, foundry resins, grinding wheel resins, brake lining resins, special phenolic polymers, rubber compounding resins.

Copies of the Data Book No. 1 can be obtained free from Information Department, British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

PANAFOAM (786,226) For foamed rubber, foamed plastics included in Class 17 in the form of sheets, slabs, rods, tubes, foils and shaped sections; and articles included in Class 17 made from the aforesaid goods. By Polyurethane Ltd., 9 Blackfriars Street, Salford 3, Lancashire. (Class 17; May 20 1959).

PLASTONET (B775,674) For fences and materials in mesh form for use in the construction of fences, all made from plastics or of materials (not wholly or principally of metal) coated with plastics. By Boulton and Paul Ltd., 14 Stanhope Gate, London, W.1. To be associated with No. 776,657 (4208,252). (Class 19; May 20 1959).

DUREX (783,836) For Carbon black (not being a pigment) for industrial use as a filling agent. By Deutsche Gold-Und Silber-Scheideanstalt Vormals Roessler (a Body Corporate organisation under the laws of Germany), 9 Weissfrauenstrasse, Frankfurt (Main) 1, Germany. Address for service is c/o Elkington and Fife, Bank Chambers, High Holborn, London, W.C.2. (Class 1; May 20 1959).

OPPASIN (786,609) For Dyestuffs for dyeing plastics and rubber. By Badische Anilin- and Soda-Fabrik Aktiengesellschaft, 38 Friesenheimer Strasse, Ludwigshafen-on-Rhine, Germany. Address for service is c/o J. Y. and G. W. Johnson, 47 Lincoln's Inn Fields, London, W.C.2. (Class 2; May 20 1959).

(779,130) For Motor land vehicles, agricultural vehicles, amphibious vehicles, waggons incorporating refrigeration apparatus, pumps for pneumatic tyres and parts and fittings for all these goods included in Class 12; and pins for cylinder blocks for motor car engines. By Gesellschaft Für Linde's Eismaschinen Aktiengesellschaft, Hildastrasse 4-10 Wiesbaden, Germany. Address for service is c/o G. F. Redfern and Co., Redfern House, Dominion Street, London, E.C.2. (Class 12; May 20 1959).

SELA-WASHER (784,494) For washers (other than tap washers) made wholly or principally of plastics. By British Screw Co. Ltd., 153 Kirkstall Road, Leeds, 4. To be associated with No. 723,329 (3946, 28) and others. (Class 17; May 27 1959.)

NEW COMPANIES

Bater-Lynn Hellwig Ltd. (626,811).—April 27. Capital: £100 in £1 shares. To carry on the business of agents for buying and selling rubber, gutta percha, balata, cocoa, spices, etc. Margaret M. Hellwig is the first director. Regd. office: 18-23 Holborn Viaduct, London, E.C.1.

Thomas Budden Ltd. (626,859).—April 28. Capital: £15,000 in £1 ordinary shares. To carry on the business of general merchants, importers and exporters, distributors and agents and shippers of tools, fittings and accessories of metal, plastic or other materials, hardware of all kinds and all forms of machinery and equipment for light engineering previously carried on by Thomas Budden at Lawrence House, Breakspear Road, Ruislip, as Thomas Budden and Co. The directors are: Thomas Budden, 8 Garden Close, Ruislip; Edward H. Bridgwater, Oaklands, 10 Grove Hill, London, E.18. Regd. office: 91/3 Bishopsgate, London, E.C.2.

Small Heath Tyre Services Ltd. (626,855).—April 28. Capital: £100 in £1 shares. The permanent directors are: Donald F. Ward, 369 Alum Rock Road, Birmingham, 8; John S. Lippett, 186 Deakins Road, Yardley, Birmingham; Frederick Smith, 43 Hollybank Road, Kings Heath, Birmingham 14. Regd. office. Edimon House, 22 Florence Road, Sutton Coldfield.

Central Tyre Service (Gorseinon) Ltd. (627,033).—April 29. Capital: £5,000 in £1 shares. The directors are: Cecil J. Littlejohns and Mrs. Hazel M. Littlejohns, both of 344 Gower Road, Sketty, Swansea. Regd. office: 59 Eversley Road, Sketty, Swansea.

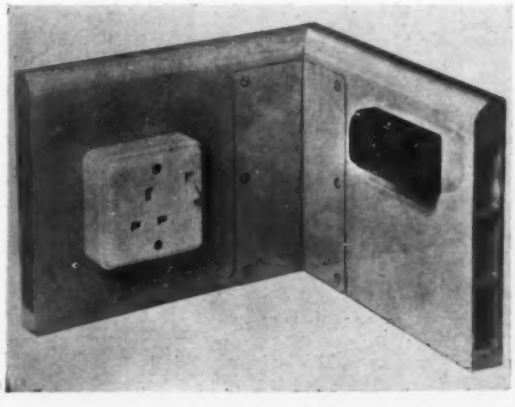
Camps Tea Co. Ltd. (626,863).—April 28. Capital: £1,000 in £1 shares. To carry on the business of importers and brokers of, and dealers in, tea, rubber, coffee, cocoa, etc. The directors are: Elisabeth A. Booth, 36 Finches Park Road, Lindfield, Sussex; David Shelton, 6 Clifton Way, Peckham, London, S.E.15. Regd. office: Clune House, 17 Surrey Street, Strand, London, W.C.2.

Fibre Plastic Manufacturers Ltd. (626,927).—April 29. Capital: £100 in £1 shares. To carry on the business of manufacturers of, and wholesale dealers in, fibre-glass and plastic materials and plastic articles, etc. The permanent directors are: Frank E. Conway, 3 Mayfair Road, Blackpool; William Davis, 12 Lime Grove, Thornton, Lancs. Regd. office: Yorkshire Penny Bank Chambers, Abingdon Street, Blackpool.

Plastic-Accs Ltd. (627,538).—May 6. Capital: £1,000 in £1 shares. To carry on the business of importers, exporters, etc. The directors are: Norman Whyte, 55 Collinwood Gardens, Gants Hill, Ilford; Mrs. Leila Whyte, 55 Collinwood Gardens, Gants Hill, Ilford; directors of Sidecraft Optical Co. Ltd.; Jane Bark, 29 Lynton Crescent, Gants Hill, Ilford. Regd. office: 39/40 Devonshire Chambers, 146 Bishopsgate, London, E.C.2.

Firo Ceramics Ltd. (627,091).—April 30. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of, and dealers in, ceramic articles and plant, machinery, moulds and patterns for use in connexion with the production, moulding and working of ceramics, plastics, etc. The permanent directors are: Stanley T. E. Fiddy, 15 Blagdens Close, London, N.4., director of Enamel Spray Ltd.; Joseph H. R. Rowell, 26 Gilda Court, Watford Way, London, N.W.7. Regd. office: 631 Green Lanes, London, N.8.

J. A. Gordon (Stroud) Ltd. (627,235).—May 1. Capital: £10,000 in £1 shares. To carry on the business of mechanical, constructional, chemical, refrigeration, mining, ceramic, plastic and general engineers, etc. Solicitors: Kent, Jones and Done, Alsager, Stoke-on-Trent.



A skirting duct introduced by the Key Engineering Co. Ltd. has the appearance of conventional skirting but contains a variable number of wiring compartments. The skirting is constructed of laminated phenolic resin and is available in two thicknesses. Similar to this is the 'Dado Duct,' by the same manufacturers, which can be fitted at or above desk height for desk-mounted portable electrical equipment

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on July 1 1959

Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, and Brüning. Polyesters. 815,902.

Dunlop Rubber Co. Ltd. Apparatus for controlling tension in filamentary or strip material wound from a package to a former. 815,736.

Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, and Brüning. Process for dyeing textile materials of linear aromatic polyesters. 815,738.

Wingfoot Corporation. Safety tyre construction. 815,743.

H. T. H. Peck Ltd. Expanding hose form. 815,750.

Goodyear Tire and Rubber Co. Belt. 815,910.

Dunlop Rubber Co. Ltd. Method of forming mats and the like of thermoplastic material. 815,914.

London Rubber Co. Ltd. Finishing of dipped rubber goods. 815,825.

Koppers and Co. Inc. Polymerization process. 815,826.

Monsanto Chemical Co. Production of a thermoplastic interpolymer. 815,821.

H. Newly (Chemische Werke Hüls A.G.). Plasticization of synthetic rubber. 815,828.

London Rubber Co. Ltd. Application of flock to the surfaces of articles. 815,834.

Dow Chemical Co. Process for making copolymers of monovinylbenzene compounds and unsaturated alkyd resins. 815,839.

Lonza Electric and Chemical Works Ltd. Treatment of polyesters. 815,843.

Esso Research and Engineering Co. Vulcanizing compositions comprising chlorinated butyl rubber. 815,939.

United States Rubber Co. Adhesive compositions and use of same in bonding textiles to rubbers. 815,860.

General Aniline and Film Corporation. Epoxy ether resin-polymethoxy acetal compositions. 815,887.

Increases of Capital

London Rubber Co. Ltd. (488,344), Bilbao House, New Broad Street, E.C.2. —Increased by £200,000 in 2s. ordinary shares beyond the registered capital of £1,000,000.

Rubber Journal and International Plastics CLASSIFIED ADVERTISEMENTS

APPOINTMENTS WANTED

6d. a word, Minimum 10/- Box 2/-

WELL-QUALIFIED chemist and technologist seeks senior executive post with public company or research organisation, experienced in most phases of the rubber industry.—Box 168. (168)

ARTICLES WANTED

6d. a word, Minimum 12/6. Box 2/-.

WANTED. Rubber spreading machine.—Box 177. (177)

APPOINTMENTS VACANT

6d. a word, Minimum 10/- Box 2/-

A HOME sales manager is required by a large group of companies specializing in rubber and plastic productions. Thorough knowledge of all aspects of selling is essential and applicants must be of high calibre and only those with proved records of success in similar positions should apply. Good salary, superannuation scheme and excellent prospects will be offered to the successful candidate. Apply in confidence giving full personal and commercial particulars to:—Box 172. (172)

AN expanding and progressive company, in the South Bucks area, specializing in the manufacture of synthetic rubber mouldings, requires an experienced rubber technologist for work in their laboratory. Applications are invited from young men, age 26-32, who must be of A.I.R.I. standard and have had several years' experience of compounding and testing of synthetic rubbers. This is a permanent post, offering good opportunities and carrying all up-to-date employment benefits. Please write, giving a summary of education, qualifications and experience, and apply for a detailed application form, to:—Box 184. (184)

CHEMIST required with experience in compounding natural and synthetics and of process control. Several years' experience and A.I.R.I. or equivalent preferred. Applications marked confidential should give full details of education and experience.—Box 161. (161)

CHEMIST required for development laboratory. B.Sc. or H.N.C. level, with some knowledge of rubber desirable, but not essential. Apply giving full details to:—Personnel Manager, The Rubber Regenerating Co. Ltd., First Avenue, Trafford Park, Manchester, 17. (174)

APPOINTMENTS VACANT

DUNLOP RUBBER CO. LTD., MANCHESTER

A small number of vacancies exist for
SENIOR RUBBER TECHNOLOGISTS
to fill key positions in the Technical Department.

Special training for executive responsibility will be provided where necessary, but some initial administrative ability is essential.
Opportunities exist for both Development and Process Control Engineers and Chemists.
Applications are invited from qualified and enthusiastic young men in the 28-40 age group with A.I.R.I. or B.Sc., and at least five years' experience in the General Rubber Goods field.
Particular experience in either Compounding, Mill Process Control, General Quality Control, Proofing or Product Development would be an advantage.
Salaries available are commensurate with the experience demanded and responsibility involved, and prospects of promotion along clearly defined lines are exceptionally good.
Applications should be addressed to:—
Technical Personnel Officer, Dunlop Rubber Co. Ltd. (G.R.G. Division), Cambridge Street, Manchester, 1. (178)

ASSISTANT to foreman in rubber moulding department required by manufacturers of precision rubber products, situated in south-west Middlesex area. Company house available, if required.—Details of experience to Box 166. (166)

JUNIOR technologist to under-study departmental manager, required by a specialized rubber manufacturer in South-West London area. Experience in high presssure moulding desirable. A company house could be made available. This position offers scope for hard-working man with ability to reach senior managerial status.—Details of experience to Box 179. (179)

RUBBER technologist as assistant manager proofing department, Greengate and Irwell Rubber Co. Ltd., Greengate Works, Salford, 3. Sound practical knowledge all processes, particularly isocyanate bonding to terylene, nylon, etc., fabrics, and use of all synthetic polymers. Salary commensurate with experience. Good prospects.—Apply in confidence to the Managing Director. (176)

SOUTH AFRICA. Wanted plastic and rubber technician. Must have practical experience of calendering and spreading plastics and able to control production. Good salary and prospects. Write stating age and experience in chronological order to:—Box RP.146 c/o 191 Gresham House, E.C.2. (169)